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FAA PROGRAM MANAGER'S GUIDE

APRIL 1994

FAA Program Manager's Guide

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Points Of Contact

Each chapter has one person designated as the point of contact for additional information.

Chap.	Contact & Title	Rtg.Symbol	Phone No.
1	Dave Morissey Acquisition Review And Approval	ACQ-1	202-267-3320
2	Joseph R. DeMeo System Engineering And Requirements Process	ASE-3	202-287-8602
3	Kevin Bridges Research, Engineering And Development (R,E&D) Plan	APM-300	202-287-8722
4	Edwin Camacho Capital Investment Plan	APM-300	202-287-8723
5	Paulette Lutjens FAA Budget Process	ABU-100	202-267-3744
6	Rebecca Taylor NAS Test And Evaluation Policy	ASE-600	202-287-8649
	Rebecca Taylor Test And Evaluation Master Plan	ASE-600	202-287-8649
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10	Thomas Pope The NAILS Program	ANS-410	202-267-7985
11	Kenneth Ward Procurement Readiness Review	AND-4	202-267-9080
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16	Roger Martino Nondevelopmental Items	ACQ-10	202-267-8506
17	Paul Przedpelski Procurement Quality Assurance And Industrial Evaluation	ASU-400	202-267-8904
	Paul Przedpelski Production Engineering Management	ASU-400	202-267-8904
19	Guy Hawkes Deployment Readiness Review	ALM-200A	202-267-7489
20	Susanna Leon-Guerrero Labor Relations	ALR-100	202-267-3409
21	Chuck Whelan Program Reviews	SEIC	202-646-5729
22	Kathy Simays Meader Agency Procurement Requests	AIT-200	202-267-8183
23	Robert Bernard Lessons Learned	ANN-600	202-267-6511

Introduction

The FAA Program Manager's Guide provides the Program Manager (PM) with a convenient summary of current information on the acquisition process for most FAA acquisitions. It outlines the phases of the acquisition life-cycle and the acquisition process described in Department of Transportation (DOT) Transportation Acquisition Manual (TAM) Chapter 34, Appendix A, Major Acquisition Policy and Procedures, and Federal Aviation Administration (FAA) Order 1810.1, Acquisition Policy.

TAM Chapter 34, Appendix A, effective 1 January 1993, was a complete revision to DOT major acquisition policy contained in DOT Order 4200.14C, which has been canceled. The basic policy for major acquisitions (over $50 million) has not changed but the latest guidance requires more formal reporting, documentation of mission needs and plans, and specifically delegates more authority to operating administrations, such as FAA.

FAA Order 1810.1 was completely rewritten in early 1993 to include the revised DOT major acquisition policy, DOT and FAA policy on less than major acquisitions, and an extensive process description of the major acquisition life cycle.

FAA major acquisitions are accomplished with matrix management that was adopted in February 1990. Chartered by the Administrator, the program manager is supported by associate program managers (APMs) from contracts, legal, test, logistics support (NAILS), engineering, systems engineering, and other needed areas. The APMs remain in their functional organization and are designated to work on one or more programs according to agreements made between their functional organization and the PMs. In many cases the agreements are made in writing as program directives.

Program directives (PDs) describe tasks to be performed, products to be delivered, time schedules with milestones, and resource requirements, which assist the PM in planning and managing the program. PDs commit the supporting organization to satisfactory completion of agreed-upon tasks within the allotted timeframe. The PM is responsible for the complete management of program directives, which includes periodic review of program directive accomplishments, and tracking of program resources already allocated. The PM is also responsible for final review and approval of all tasks and products.

The program manager is responsible for the following:

1. Presenting and defending the program to the Acquisition Review Committee (ARC) or the Transportation Systems Acquisition Review Council (TSARC) at each KDP

2. Preparing program documentation and updating same before each key decision point (KDP). Documentation includes cost/benefit analyses (CBA), life-cycle cost (LCC) estimates, mission need statements (MNSs), and acquisition plans, among others.

3. Executing the program as approved at each KDP

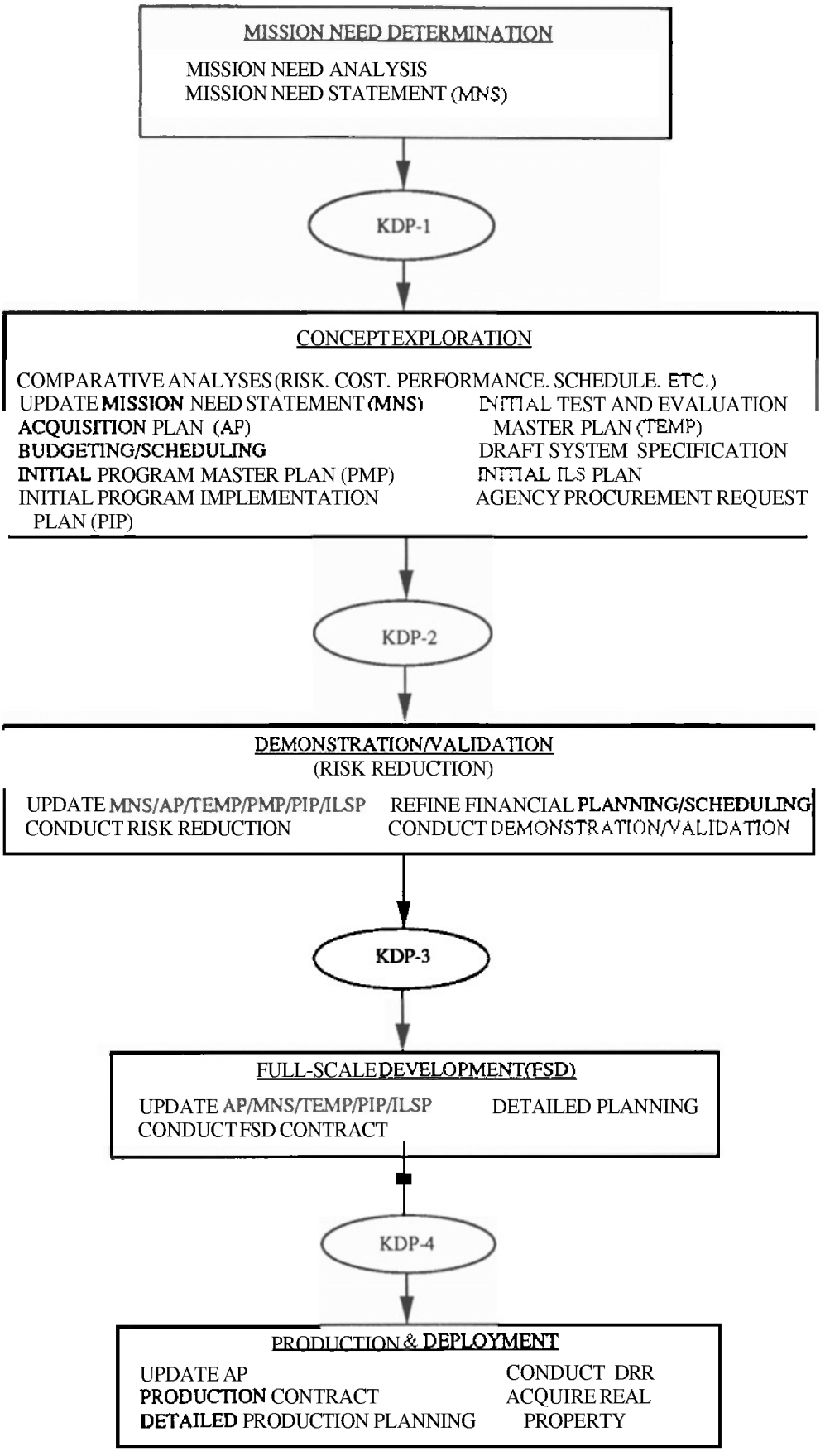
4. Reporting on program status at major acquisition reviews scheduled by the Executive Director for Acquisition, AXQ-1

5. Preparing a Test and Evaluation Master Plan (TEMP) at program initiation and updating it at each KDP. This is coordinated with the program sponsor, and approved by the Test Policy Review Committee (TPRC).

Although the Program Manager's Guide deals primarily with National Airspace System (NAS) programs, programs for providing systems, equipment or services that are not part of the NAS presently exist and PMs may encounter others in the future. Program managers have the flexibility to modify documentation for programs as defined by approved acquisition and program management plans. Test procedures for non-NAS programs differ from those used in NAS programs.

This Program Manager's Guide does not change or replace existing notices, orders, or other directives, and does not include every topic or document a program manager will need to consider. Chapters in the Guide are arranged roughly in the approximate order of events as they occur in the process. Chapters were written by subject matter experts as identified on pages iv and v. Acronyms and abbreviations may be identified in the alphabetical list provided in Appendix B.

ACQUISITION LIFE-CYCLE



Chapter 1

Acquisition Review And Approval

This chapter provides a reference guide to acquisition activities. The following topics are presented:

- Major acquisitions and the development of mission need statements **(MNSs)**
- Approval of **MNSs** and acquisition plans at key decision points **(KDPs)**
- Administrator's program review
- Advanced planning and annual procurement plans
- Acquisition plans
- Delegation of procurement authority
- Procurement requests
- Independent cost estimates
- Acquisition streamlining
- Competitive source selection process
- Non-competitive procurement
- Small and disadvantaged business procurement
- Sample procurement lead-time schedules

Process Description

A generic description of the life cycle of a NAS system is shown in Figure 1.1 on page 1-12.

Major Acquisitions and Development of Mission Need Statements

Transportation Acquisition Manual (TAM) Chapter 34, Appendix A "Major Acquisition Policies and Procedures", provides the framework for the review and approval of major acquisitions. FAA Order 1810.1, Acquisition Policy, provides specific FAA review

and approval procedures for both major and less than major acquisitions.

Major acquisitions, which are critical to fulfilling an agency mission, entail the allocation of large resources and warrant special management attention. They are defined in TAM Chapter 34, Appendix A as Levels I, II, and III.

Level I: A level I major acquisition program is defined by TAM Chapter 34, Appendix A as:

- A program exceeding $150M in total acquisition cost
- A program upgraded from a Level III
- A program otherwise designated as Level I by the DOT Acquisition Executive

Level II: A Level II major acquisition program generally is for services. Level II major acquisition programs are defined as:

- A program to acquire services exceeding $150M in total acquisition cost
- A program upgraded from a Level III
- A program otherwise designated as Level II by the DOT Acquisition Executive

Level III: A Level III major acquisition program is for the same types of items, systems or services covered under Level I or II except it is not as complex or costly. Level III major acquisition programs are defined as:

- Generally a program between $50M and $150M in total acquisition cost
- A program downgraded from a Level I or II
- A program otherwise designated as Level III by the DOT Acquisition Executive

After designation as a Level III program by the DOT Acquisition Executive, these programs are further designated as Level IIIA for items and systems or Level IIIB for services.

The FAA has added Level IV acquisitions for the same types of items, systems or services as Level I, II, or III acquisitions except total acquisition cost is less than $50 million.

To be considered a major acquisition, the project must be formally designated as a major acquisition by the Deputy Secretary, DOT's Acquisition Executive.

Those systems designated as major acquisitions follow the structured acquisition process established in OMB Circular A-109 (tailored to individual programs). This process begins with the development and approval of a mission need statement. Guidance for the preparation of MNSs is contained in Order 1810.1. MNS development and approval is followed by a concept exploration phase that often results in a more specific definition of requirements. This in turn is followed by a demonstration/ validation phase and then a full scale development phase. The production and deployment phase results in commissioning the product in the NAS or other program or mission area. Both DOT and FAA policy require the tailoring of this process so that only the appropriate essential activities and phases are conducted. Approval of the appropriate acquisition executive is provided at each key decision point to combine phases and tailor the process for each program.

The four key decision points (KDPs), that require the approval of MNSs and acquisition plans, are as follows:

- KDP I - authorizes the program to proceed with the concept exploration phase
- KDP II - authorizes the program to proceed with the demonstration/validation phase
- KDP III - authorizes the program to proceed with full-scale development
- KDP IV - authorizes the program to proceed with production and deployment of the system

OMB Circular A-109 establishes policies to be followed by executive branch agencies in the acquisition of major systems. It requires each department to appoint an acquisition executive to be the focal point for approval of major acquisition activities at KDPs. The circular defines the system acquisition process as "A sequence of acquisition activities starting from the agency's mission need, with its capabilities, priorities and resources, extending through introduction into use or successful achievement of program objectives".

Approval for Level I and II major acquisitions is given by the DOT Acquisition Executive (Deputy Secretary) and approval for Level III major acquisitions is given by the FAA Acquisition Executive (Executive Director for Acquisition). For Level IIIs, MNS approval is required from the Office of the Secretary before the program is initiated. The FAA Acquisition Executive approves

MNSs for Level IV programs, but all other acquisition executive functions are performed by the associate administrator of the performing organization.

Approval of Mission Need Statements and Acquisition Plans at Key Decision Points

Before initiating a program that is in the Capital Investment Plan (CIP), you must obtain approval from the FAA Acquisition Executive and from the DOT Acquisition Executive, as appropriate. This includes approval of mission need statements, acquisition plans and source selection plans. These documents must be updated periodically.

Before seeking approval from the DOT Acquisition Executive at a KDP, the FAA consults the Acquisition Review Committee (ARC) to decide whether the program is ready to proceed. The Program Manager presents the status of the program to this group using a briefing format that is available from the Office of Acquisition Policy and Oversight (ACQ-1).

For programs designated as major acquisitions, the FAA Acquisition Executive chairs the Acquisition Review Committee. The FAA Acquisition Executive either approves transition to the next level of development for Level III major acquisitions or, approves the FAA request for Deputy Secretary approval of Level I or Level II major acquisitions.

Administrator's Program Reviews

Programs designated for special management attention are periodically reviewed by the Administrator using a briefing format that is available from ACQ-1. See Chapter 21 for details on these reviews under "Major System Acquisition (MSA) Reviews".

Advanced Planning and Annual Procurement Plans

Federal Acquisition Regulations, Part 7, and DOT Order 4200.16A, Advance Acquisition Planning and Annual Procurement Plan, are the basic directives that describe responsibilities and procedures for the planning that precedes contracting for goods and services. The DOT order requires the FAA to develop an Annual Procurement Plan. This plan includes all proposed procurements exceeding $2M, and all proposed service contracts costing more than $200,000 and determined to be advisory and assistance services. Before any procurement meeting these criteria can proceed (i.e., Commerce Business Daily synopsis, release of a solicitation for a contract, or issuance of an inter-agency agreement), it must be included in the current plan. The FAA Administrator usually approves the Procurement Plan annually by May 15 to authorize initiation of all anticipated procurements in the upcoming fiscal year. The latest plan is maintained in the

Office of Acquisition Support (ASU-100), and an information copy is provided to OST. Planning for lower dollar procurements (between $200,000 and $2,000,000) is conducted by ASU-300 and regional and center procurement offices.

The plan is reviewed and updated at least quarterly. The updated plan is approved by the Administrator and information copies are forwarded to DOT's Office of Acquisition and Grant Management (M-60) and Office of Small and Disadvantaged Business Utilization (S-40) within five working days.

The program manager must provide information on all planned procurements or inter-agency agreements that meet the plan's dollar thresholds. Anticipated individual tasks or delivery orders and options do not need to be listed separately, if the total estimated dollar value and the description of the procurement action includes them.

Acquisition Plans

Acquisition plans are prepared following guidelines available from ACQ-1 for all major acquisitions designated by the DOT Acquisition Executive. Acquisition plans may also be required at lower levels at the discretion of FAA officials. Acquisition plans must be approved by the FAA or DOT Acquisition Executive (as appropriate) before initiating any procurement action, though draft solicitations and similar material can be released before acquisition plan approval with the concurrence of ASU-1. Acquisition plans must be updated annually, whenever there is a major change in the program, and at KDPs. The requirement to have acquisition plans for programs below $50M is actively being considered.

Delegation of Procurement Authority

Whenever the FAA needs to procure federal information processing (FIP) resources or services, the Federal Information Resource Management Regulation (FIRMR) requires that an agency procurement request (APR) for a delegation of procurement authority (DPA) be submitted to the General Services Administration (GSA). The purpose of the APR submission is to obtain delegation of GSA's single procurement authority for FIP resources or services other than those provided in GSA multiple award schedule contracts or blanket delegations.

The FIRMR is the primary source document for complying with these requirements.

Analyses and studies supporting the acquisition of FIP resources must be done sufficiently ahead of the actual procurement date to minimize delays in obtaining a delegation of authority. The preparation and approval process can range from twenty-seven (27)

to thirty-five (35) weeks depending on the studies, analyses, and justifications required. Most documentation activities can be accomplished in parallel.

The PM is responsible for preparing the APR. He/she reviews the APR strategy with AIT-340, and the Information Systems Management Division (M-32) before beginning work to verify/identify specific requirements. Early planning will avoid delays and problem areas. A briefing to OST and GSA can hasten the review process by presenting the essential facts and providing the opportunity for reviewers to meet FAA PMs. The Director, Office of Acquisition Support (ASU) requires that formal approval of APRs be obtained before ASU acts on a procurement request (PR).

For large programs, the completed APR package is submitted from the appropriate associate administrator to AIT-1, who determines the order of review and sends it to ASU, appropriate Office of the Assistant Administrator for Information Technology (AIT) staff, and ACQ-1 for review and approval. The DOT Office of Information Resource Management (M-30) will contact the program office to arrange any briefings to the Office of the Secretary of Transportation, if required. The package is submitted to GSA by M-1. Figure 1.2 summarizes acquisition coordination and approval thresholds.

Lack of early planning is most often the cause of delays and problems. The package can be complex and have many components. AIT and M-30 can help identify requirements for specific projects. Early planning is essential. A new document, Guide to the Preparation of Agency Procurement Requests, is available from AIT-340. Also, see Chapter 22 of this Guide for a summary.

Procurement Requests and Independent Cost Estimates

Each requiring office must prepare a PR in order to initiate contracting action. For larger projects, allow 6-12 months before the planned date of solicitation release to accomplish the following:

- Specification approval
- Preparation and internal coordination of the draft PR
- Industry comments on the draft specification, and draft solicitation, if required

ASU generally requires that PRs for major NAS or non-NAS projects, subsystems and components reach them at least twelve (12) months before the needed contract award date. The PR should include options for out-year requirements, where appropriate, to reduce the need for future contract actions, particularly for non-competitive procurements.

An independent Government cost estimate is required for every PR. Cost information should be broken down to the lowest level possible. The contracting officer can provide samples.

When funds will be transferred to another agency (e.g., the National Aeronautics and Space Administration (NASA) or the Department of Defense (DOD)), the program manager should coordinate with the contracting officer as early as possible in the process to ensure that all appropriate approvals are obtained. The FAA Acquisition Manual Subchapter 1204.70, Preparation, Approval and Processing of Procurement Requests, is the guidance for preparing procurement requests. Copies may be obtained from ASU-100.

Acquisition Streamlining

Acquisition streamlining can reduce the time necessary to award contracts and improve the quality of contract documents. Streamlining includes the following:

- Reviewing draft solicitations to eliminate counter-productive and over-specified requirements, and obtain industry comments on draft documents
- Avoiding premature application of specifications and standards
- Tailoring specifications to eliminate inadvertent establishment of requirements through indirect referencing of lower level specifications
- Including only essential data requirements in the Contract Data Requirements List (CDRL), and tailoring those
- Limiting the number of pages in a solicitation
- Limiting the number of pages in proposals received under a solicitation
- Having a small dedicated proposal evaluation team
- Coming to an early agreement on the logistics support concept

Competitive Source Selection Process

Transportation Acquisition Manual Subchapter 1215.6, Source Selection, establishes procedures for soliciting, evaluating, and selecting sources to perform major negotiated procurements. The Administrator/Deputy Administrator must approve a selection plan for every competitively negotiated procurement over $5M, and a

Source Evaluation Board (SEB) must be used unless a waiver is approved. The source selection process is structured to ensure the impartial, equitable, and thorough evaluation of proposals, and to provide necessary data to the source selection official for selection of that contractor who offers best value to the Government. The Administrator or another senior FAA official acts as the source selection official for all FAA procurements subject to SEB requirements.

A program manager is responsible for:

- Providing input to ASU-100 to develop the Selection Plan which must be approved before a competitive solicitation can be issued
- Developing Request for Proposal (RFP) materials, including the evaluation criteria, in conjunction with the contracting officer
- Ensuring proper staffing for SEB activities
- Complying with standards of conduct concerning SEB evaluation activities

Non-Competitive Procurement

Statutes, regulations, and DOT and FAA policy require senior management approval on all procurements to be awarded non-competitively. A Justification for Other than Full and Open Competition (JOTFOC) must be approved by management officials as set forth in Transportation Acquisition Regulation, Part 1206.3. The contracting officer can approve JOTFOCs up to and including $100,000. The FAA Competition Advocate (AXQ-1) approves JOTFOCs from $100,000 to $1,000,000. All proposed non-competitive procurements over $1,000,000 are approved by the FAA Administrator. Requirements for JOTFOCs and associated documents are described in FAA Acquisition Manual Chapter 1206.3 issued as FAA Notices 92-06 and 92-09.

Prior to processing a JOTFOC acquisition, a PM must provide convincing evidence that only one supplier can meet the Government's need. Whenever successive purchases of identical or related products are anticipated, the project manager and contracting personnel should consider obtaining data and rights to allow competitive re-procurements. The PM is responsible for providing persuasive information supporting the sole-source action asked for in the PR. Before preparing a justification, informal coordination with ACQ-1 and ASU-100 is recommended.

For recurring procurements, the PM should start with the previous contract, identify the changes needed for this procurement, and develop the required documentation from this baseline.

Small and Disadvantaged Business Procurement

For procurement through the Small Business Administration, called Section 8(a) procurement, coordination with the Small and/or Small and Disadvantaged Business Specialist (ACQ-4) is required.

Current procurement regulations require all proposed procurement actions to be reviewed to determine if they can be set aside exclusively for small business or small disadvantaged business. This review is performed after a procurement request is received in the contracts office.

If adequate small businesses are available to meet the requirement, the procurement is set aside exclusively for small business. If minority contractors certified by the Small Business Administration, commonly known as Section 8(a) contractors, are determined to be able to do the work, a competitive or sole-source acquisition is initiated to allow these contractors to meet FAA requirements. Recent changes in procurement regulations now require competition for most large 8(a) procurements over $3M (for services), and over $5M (for manufacturing). With proper planning and coordination, smaller Section 8(a) procurements can be awarded about 6 months after receipt of a complete PR.

Sample Procurement Lead-Time Schedules

Figure 1.3 shows a sample lead-time schedule for regular competitive procurements. Figure 1.4 shows a sample schedule for regular non-competitive procurement. Figure 1.5 is a sample lead-time schedule for 8(a) negotiated competitive procurements over $3M, and Figure 1.6 is a schedule for 8(a) non-competitive procurements.

Contacts

The following staffs and divisions can assist with additional information on acquisition review and approval:

- ACQ-1 - Provides support in developing MNSs and acquisition plans, and provides information for internal and OST approvals related to the acquisition process
- ASU-100 - Assists in developing acquisition and selection plans. A specific contracting officer from ASU-300 will be assigned as the contracting officer for the project team in the planning, execution, and administration of contracts.
- AGC-500 - Provides legal assistance to the Program Manager and contracting officer

- AIT-300 - Assists with DPAs

- The contracting officer assigned to each program can provide specific guidance about contract award and administration matters. ACQ-1 and ASU-100 will provide assistance in drafting the necessary approval documents as well as coordinating those documents within FAA and OST.

Some specific contacts and telephone numbers are:

- ASU-120, 202-267-7862, can be contacted for assistance with advanced procurement planning, selection plans, and advanced procurement plans

- ASU-300, 202-267-3580, involves the appropriate contracting officer supporting each project in the planning effort

- ACQ-1, 202-267-8506, can be contacted regarding MNSs, acquisition plans, major acquisition reviews, non-competitive procurement issues, and general planning actions

- AIT-340, 202-267-9991, can be contacted regarding the delegation of procurement authority

- AXQ-4, 202-267-8881, is the contact point for the Small Disadvantaged Business Program, including Section 8(a) contracting

Reference Documents

The following document is the basis for the guidelines presented on delegations:

- "Source Selection Delegation", memorandum from the Secretary of Transportation to the Administrator, dated December 20, 1987

The following documents are the basis for the guidelines presented on acquisition planning:

- DOT 4200.16A, Advance Acquisition Planning and Annual Procurement Plan, dated September 6, 1989

- Guide to the Preparation of Agency Procurement Requests (AIT publication), dated February 1994

The following documents are the basis for the guidelines presented on non-competitive procurement actions:

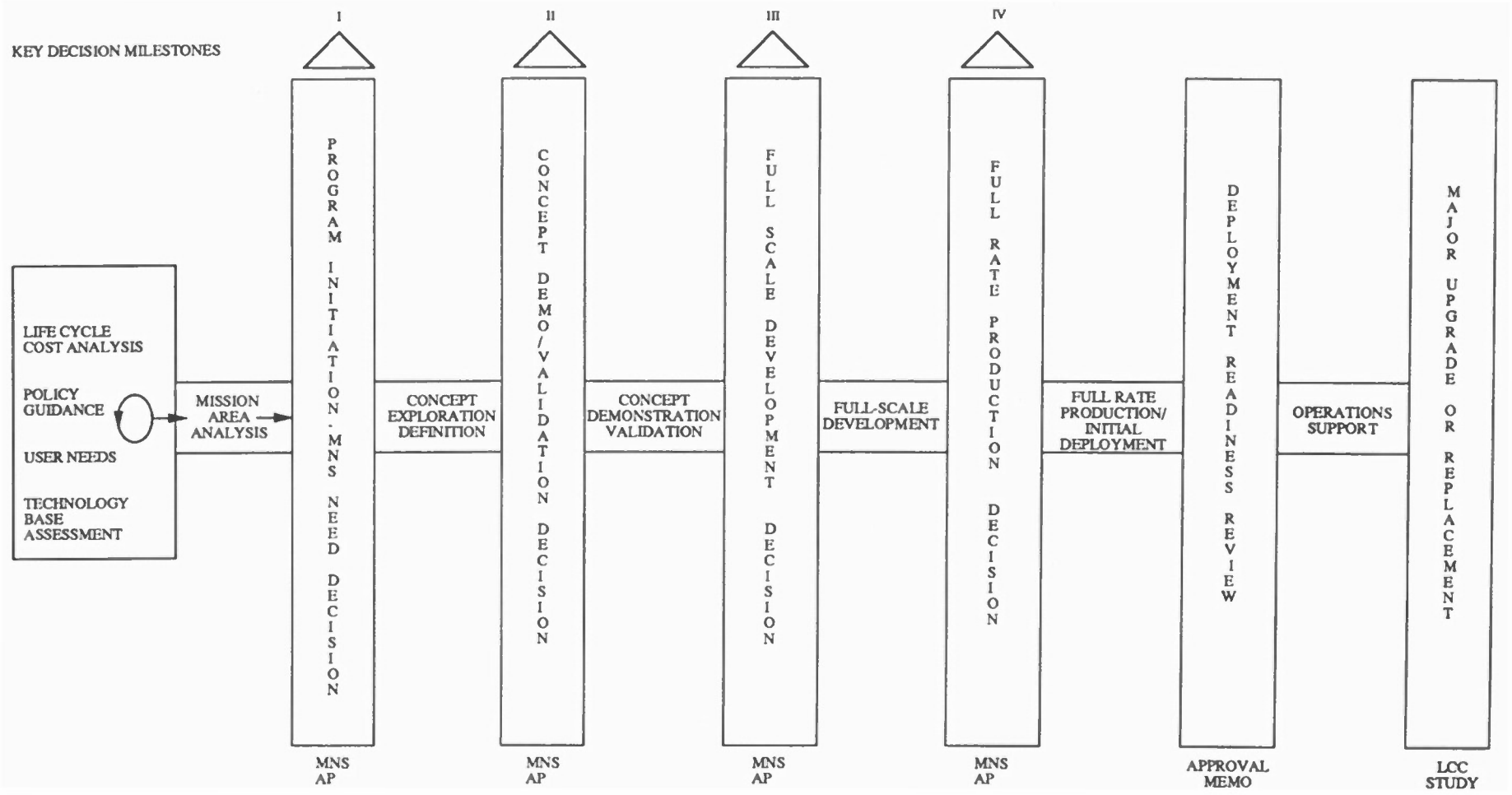
- Federal Acquisition Regulation, sub-part 6.3
- Federal Acquisition Regulation 34.001
- Transportation Acquisition Regulation, sub-part 1206.3
- Order 4405.6B, Review and Approval of Proposed Other Than Full and Open Competition Procurements

The following documents are the basis for the guidelines presented on source selection:

- Transportation Acquisition Manual Sub-chapter 1215.6, Source Selection

Point of Contact for Chapter 1 is Dave Morissey, ACQ-1, 202-267-3320.

FAA ACQUISITION PROCESS FOR A MAJOR PROGRAM



KEY NAS DOCUMENTATION:

AP - ACQUISITION PLAN OR UPDATE TO OST FOR APPROVAL
MNS - MISSION NEED STATEMENT OR UPDATE

FIGURE 1.1

ACQUISITION COORDINATION AND APPROVAL THRESHOLDS

ACTION	THRESHOLD	FAA COORDINATION	FAA APPROVAL	OST COORDINATION	OST APPROVAL
Acquisition Plan	Level IV	1,2,3,4	Associate Administrator		
	Level III	1,2,3,4	Acquisition Executive	Copy to Deputy Secretary	
	Level I and II	1,2,3,4	Acquisition Executive	TSARC staff	Deputy Secretary, unless delegated to M-1
Selection Plan Level I, II, & III	Over $50M	1,2,3,4	As described in approved Acquisition Plan		
	$5M to $50M		Associate Administrator of performing organization identified in Mission Need Statement		
Justification for Other Than Full and Open Competition (JOTFOC)	$25 to $100,000	1, AGC	Contracting Officer		
	$100,000 to $1M	1, AGC	AXQ-1		
	Over $1M	1,2,3, AGC	AOA-1		
Mission Need Statements	All	1,2,3,4	AOA-I	TSARC staff	S-2 unless delegated
Advisory and Assistance Services	Over $200,000	1,2,3, ASU	AOA-1	Send information copy of Annual Procurement Plan to M-60 and S-40	

FIGURE 12

ACQUISITION COORDINATION AND APPROVAL THRESHOLDS (CONT.)

ACTION	THRESHOLD	FAA COORDINATION	FAA APPROVAL	OST COORDINATION	OST APPROVAL
Procurement Requests (first 3 quarters)	Under $25,000	1 or lower	1 or lower		
	$25,000 to $100,000	1 or lower	1 or lower		
	$100,000 to $500,000	1 or lower	1 or lower		
	$500,000 or greater	1 or higher	1 or higher		
	Unlimited for CIP Program	As appropriate	AOA-I chartered Program Manager		
Procurement Requests (4th quarter)	$5,000 or less	1	1 or lower		
	Over $5,000	1	2		
	Over $500,000	AOA-1 chartered Program Manager	1		
Annual Procurement Plan (required March 15 for next FY for procurements over $2M except for advisory and assistance services)	1,2,3,4	ASU-100	AOA-1	Information copy to M-60	
		Interim updates require memo to ASU-100			

KEY

1 - Service Director
2 - Associate Administrator
3 - Executive Directors
4 - Other Affected 1,2, and 3

If other offices are involved or supplying funds, coordination with those offices is required (see special requirements for training, conference space, audio visual, NAILS, advisory and assistance services, contracting with DOT and former DOT employees).

FIGURE 1.2

SAMPLE PROCUREMENT LEAD—TIME SCHEDULE FOR MAJOR DOLLAR VALUE COMPETITIVE PROCUREMENT

The following steps apply to procurements estimated to cost $50M or more, to be awarded competitively, and to exclude 8(a) procedures. Historically, it has taken ASU 9 to 14 months after receiving a PR to award a major production contract.

Program Manager Lead Responsibilities Pre—Procurement Steps

1. Prepare draft specifications and obtain approvals
2. Acquire industry comments on draft specifications
3. Prepare a NAS Change Proposal (NCP), if necessary, and obtain approval
4. Prepare a PR, obtain internal approvals, and submit to ASU

Total time to complete the above steps is 90—365 calendar days.

ASU Lead Responsibilities	Time
1. Receive the PR	T*
2. Prepare a synopsis and submit to Commerce Business Daily	T + 15 days
3. Draft request for proposal and obtain comments from the SEB	T + 75 days
4. Release RFP after SEB approval	T + 80 days
5. Receive technical proposals	T + 170 days
6. Receive cost proposals	T + 180 days
7. Evaluate proposals, determine the competitive range, and receive any audits required	T + 260 days
8. Negotiate technical factors and cost	T + 305 days
9. Request and receive best and final offers	T + 320 days
10. Evaluate best and final offers	T + 335 days
11. Prepare the SEB report	T + 345 days
12. Obtain the source selection official decision	T + 365 days
13. Award contract and release via Public Affairs Office	T + 370 days

* T is the date a complete PR, with funding, is received in ASU. Days are calendar days.

FIGURE 1.3

SAMPLE PROCUREMENT LEAD—TIME SCHEDULE FOR MAJOR DOLLAR VALUE NON—COMPETITIVE PROCUREMENT

The following steps and timeframes apply to procurements estimated to cost $50M or more, to be awarded without full and open competition, and to exclude 8(a) procedures. Historically, it has taken ASU 9 to 12 months after receiving a PR to award a contract.

Proaram **Manaqer** Lead Responsibilities

1. Prepare draft specifications and obtain approvals
2. Acquire industry comments on draft specifications and perform market survey
3. Prepare an NCP, if necessary, and obtain approval
4. Submit an approved PR to ASU

Total time to complete the above steps is 90—365 calendar days.

ASU Lead Responsibilities		Time
	Receive the PR	T*
	Prepare a synopsis and submit to Commerce Business Daily	T + 15 days
	Draft an RFP and obtain approval of the JOTFOC	T + 60 days
	Prepare a second synopsis	T + 75 days
5.	Release the RFP	T + 80 days
6.	Receive proposals and request audit	T + 140 days
7.	Audit received	T + 215 days
8.	Proposals evaluated	T + 245 days
9.	Technical cost negotiations complete	T + 290 days
10.	post—negotiation approval	T + 310 days
11.	Award contract and release news via Public Affairs Office	T + 320 days

* T is the date a complete PR, with funding, is received in ASU. Days are calendar days.

FIGURE 1.4

SAMPLE PROCUREMENT LEAD-TIME SCHEDULE FOR 8(A) NEGOTIATED COMPETITIVE PROCUREMENT OVER $3M

Program Manager Lead Responsibilities

1. Prepare draft specifications and obtain approvals
2. Acquire industry comments on draft specifications and perform market survey
3. Prepare an NCP, if necessary, and obtain approval
4. Submit an approved PR to ASU

Total time to complete the above steps is 90-365 calendar days.

	ASU Lead Responsibilities	**Time**
	Prepare synopsis/letter to SBA	T* + 7 days
	SBA response to offering letter	T + 28 days
	Issue RFP	T + 42 days
	Receive technical proposals	T + 84 days
	Receive cost proposals	T + 94 days
	Complete technical evaluation	T + 112 days
	Determine competitive range and request audits	T + 119 days
8.	Send competitive range letter to SBA	T + 126 days
9.	SBA determines eligibility	T + 133 days
10.	Receive audit reports	T + 161 days
11.	Pre-negotiation position approved	T + 182 days
12.	Complete negotiations, request best and final offers (BAFOs)	T + 210 days
13.	Receive BAFOs	T + 224 days
14.	Award approval	T + 252 days
15.	Award contract	T + 273 days

* T is the date a complete PR, with funding, is received in ASU. Days are calendar days.

FIGURE 1.5

SAMPLE PROCUREMENT LEAD-TIME SCHEDULE FOR 8(A) NEGOTIATED NON-COMPETITIVE PROCUREMENT

Program Manaaer Lead Responsibilities

1. Prepare draft specifications and obtain approvals
2. Acquire industry comments on draft specifications and perform market survey
3. Prepare an NCP, if necessary, and obtain approval
4. Submit an approved PR to ASU

Total time to complete the above steps is 90-365 calendar days.

ASU Lead Responsibilities	Time
1. Prepare synopsis and offering letter for SBA	T* + 7 days
2. SBA response to offering letter	T + 28 days
3. Issue RFP	T + 35 days
4. Receive proposal and request audit	T + 63 days
5. Complete technical evaluation	T + 91 days
6. Receive audit report	T + 105 days
7. Pre-negotiation position approved	T + 112 days
8. Complete negotiations	T + 133 days
9. Award approval	T + 154 days
10. Award contract	T + 175 days

* T is the date a complete PR, with funding, is received in ASU. Days are calendar days.

FIGURE 1.6

Chapter 2

System Engineering And Requirements Process

This chapter discusses FAA's system engineering process applied during the system life-cycle, its input and output, and the associated requirements determination process.

FAA's system engineering process encompasses all those technical and management activities that must be accomplished to produce and deliver to the field a system that satisfies the operational need and is affordable, reliable and supportable. It also encompasses the activities in the operations and maintenance phase of the system life-cycle associated with the assessment of system performance and deficiency correction. This system engineering process requires the active, mutually supporting, participation of FAA operational elements, system engineering organizations and system acquisition offices.

System engineering is an iterative problem solving process, starting with input (problem description) and ending with output (system description representing a problem solution). This is an information-driven process since descriptions are progressively transformed from input, at each intervening step, to output at succeedingly greater levels of detail.

FAA's system engineering process is applied during each phase of the system's life-cycle. The process is used to identify and define operational mission needs, transform the operational needs into system performance parameters and a system description, and to identify, define, and allocate the functional characteristics for each NAS subsystem. The functions are allocated to equipment (hardware and software), facilities, procedures, and personnel.

A generic system engineering process consists of the following major elements:

- Requirements analysis
- Functional **analysis/allocation**
- Synthesis
- System analysis

Requirements analysis is initially concerned with deriving technical performance requirements from approved statements of mission need. In subsequent acquisition phases, requirements analysis is applied iteratively to provide progressively more detailed technical performance requirements definition.

Functional **analysis/allocation** identifies the functions that must be performed, defines functional performance requirements and allocates these functions to different system elements.

Synthesis is initially concerned with preliminary system concept descriptions or alternatives that may contain different functional allocations. Functional analysis results are used during the synthesis step of the system engineering process. Synthesis provides the basis for determining to which NAS subsystem required functions should be allocated.

System analyses is applied concurrently with the other activities to assess alternatives in meeting system requirements. During system analysis there is an examination of key factors in a quantitative manner for selection of a cost—effective solution. The selected solution is then documented in a specification format. At the NAS level, the system description documentation is comprised of the NAS Level I Design Document **(NAS-DD-1000)** and NAS System Specification (NAS—SS—1000). Figure 2.1 shows the relationship of the major system engineering process functions.

Process Description

To better understand the FAA system engineering process, the following topics will be presented:

- System engineering and the acquisition process
- Requirements determination
- Mission need analysis
- Mission need statement
- System requirements
- Requirements traceability
- Requirements changes
- NAS system description documentation
- System engineering management

System Engineering and the Acquisition Process

The continuing growth and diversity in aircraft operations and increasing sophistication of aircraft and avionics are placing unprecedented demands on the National Airspace System (NAS) of the future. In response to this, the NAS is evolving into a very complex and highly interdependent system. The design and acquisition of the evolving NAS systems is a major engineering undertaking, and requires a sustained and comprehensive FAA-wide system engineering process for supporting the FAA system acquisition life-cycle.

The FAA system acquisition life-cycle is based on the Office of Management and Budget (OMB) Circular A-109 which established a structured process for major system acquisitions in the federal government. Within FAA, the A-109 acquisition concept is applied to both major and non-major system acquisitions.

The major system engineering objectives of the various phases of the FAA system acquisition life-cycle along with the associated requirements determination process are shown in Figure 2.2. System engineering activities supporting these objectives require full participation of and contributions from various organizations throughout the agency.

Requirements Determination

The phrase Requirements Determination as defined herein refers to a set of activities that precedes the preparation of a formal specification for a NAS subsystem. Requirements Determination is evolutionary and consists of a set of generic activities that occur in one form or another during each phase of the process.

Within the framework of FAA's acquisition process, the first occurrence of Requirements Determination begins prior to Key Decision Point #1 (KDP-1) with a description of mission need in the form of a mission need statement and spans across KDP-1 into Phase 1 where a Type A system level specification is developed. As the program matures and passes through succeeding phases of FAA's acquisition process, other Requirements Determination takes place resulting, in order of occurrence: a type B development specification, and a type C production specification as well as other related specifications, such as type D and type E.

During Phase 0 the Requirements Determination takes place in the form of describing a shortfall in mission capability and expressing this in a format of a mission need statement. During the development of a mission need statement, a mission need analysis activity assists in identifying and analyzing relevant data that clarifies and explains the mission need in terms needed to support the FAA's Acquisition Review Committee (ARC) KDP-1 decision process.

Mission Need Analysis

A. Background

As recently introduced within FAA, MNA is the initial activity of the formal acquisition process. This initial phase relies heavily on analysis to define a problem of mission capability shortfall. In this sense, mission capability refers to those functions that must be performed for FAA to provide the services dictated by statute. The objective of MNA is to support the development of sound mission need statements (MNSs). An MNS is a convenient form for summarizing specified items of information to facilitate review and approval by senior FAA managers.

As the initial phase of the system acquisition process, MNA involves defining a problem, while the remainder of the phases relate to the development of a cost-effective solution, and its production/deployment, operation and support. The MNA activity ends when a mission need statement has been reviewed and approved by the appropriate FAA acquisition executive which constitutes receiving key decision point-1 (KDP-1) approval. The basic idea for MNA is that the justification for acquisition decisions can be vastly improved through more effective efforts to identify, describe, and explain mission capability shortfalls as one major prerequisite to initiating a new acquisition program.

In view of the rapid pace with which technology advances, providing an increasingly varied array of software, hardware, and system choices, it is essential to understand mission needs stated in terms of functional capabilities rather than in terms of specific equipment or technology. When it is realized that systems acquired today may have lifetimes of 20 or more years, it is clear that with present rates of change, technology will advance through ten or more cycles of development during this period. In this environment, specifying particular equipment configurations as solutions to operational needs quickly becomes an exercise in dealing with obsolete technology.

Approval and funding for new FAA programs has become increasingly difficult to justify using criteria that only a few years ago were considered to be sufficient. Over the years, FAA's budgets have consistently increased as efforts to modernize the National Airspace System (NAS) infrastructure have progressed and this has tended to increase the amount of oversight received. More recently, oversight agencies and Congressional committees have been imposing more stringent demands on FAA to demonstrate that quantitative analysis is being to support acquisition decisions.

Thus, it is essential that FAA improves its methodology for defining mission needs with the expectation that this will lead to improved definition of post KDP-1 system requirements. This includes improving the methodology to translate mission needs

into formal specifications for use in identifying a range of feasible conceptual system designs from which to select the most cost-effective choice, during the post KDP-1 phases of a system acquisition program.

The balance of this section describes MNA as it is conceptualized and being implemented throughout the agency.

B. Mission Need Analysis Process

For the purpose of this Guide, it is convenient to regard KDP-1 as partitioning the life-cycle of a generic system into two contiguous domains. In Figure 2.3, the first of these domains is referred to as Problem Definition which is shown to the left of KDP-1. The second domain is referred to as Problem Solution and is shown to the right of KDP-1.

The post-KDP-1 phases of the acquisition process are the ones that are most familiar to the majority of hardware and software system engineering in FAA. On the other hand, the pre-KDP-1 phase is the least familiar, even though it is both a legitimate and logical part of a system acquisition process. During the concept exploration phase of a particular system acquisition program, a system level specification (Type A) is developed which defines the system requirements that eventually are translated into a range of system design concepts and ultimately into the preferred operational system by various kinds of system engineers and technical managers.

During MNA, however, there is no system-level specification; instead, there is only mission needs determination. What is sought is a clear understanding of the shortfall in mission capability and a way to develop a valid representation of the entailed functional deficiency, both in symbolic and narrative form. An important aspect of MNA is to determine the degree of operational urgency involved in satisfying a mission need.

Not all mission needs are necessarily satisfied by a formal acquisition process, including the kind of review and approval decision processes as might be involved in the case of a major system acquisition. In fact, FAA Order 1810.1F requires that all feasible low-capital intensive investments be identified and evaluated as possible ways of satisfying a given mission need as a precondition to initiating a new system acquisition program. Within FAA these low-capital intensive investment possibilities are referred to as non-materiel solution approaches and the assessment of these takes place during MNA.

Thus, MNA is a process to develop a problem statement and to determine if satisfaction of that need can be achieved by low cost approaches such as changes in procedures or policy, reallocation of existing assets, or improved training before

development of a mission need statement. Only for the case where MNA has established that these low cost solution approaches are infeasible does it become possible to consider a new system acquisition program. In the latter case, MNA is often thought of only as providing the justification for initiating a new system acquisition program; however, as conceptualized, it is intended to identify and satisfy mission needs. In other words, the objective of **MNA** could be expressed as assuring that FAA acquires the requisite capabilities to provide mission services.

Identification and evaluation of low-cost alternative approaches are associated with MNA so that these possibilities may be considered during **pre-KDP-1.** On the other hand, development and assessment of alternative system design concepts are associated with Phase 1 Concept **Exploration/Alternative** Analysis. Often these two sets of related, but distinct descriptors become confused, resulting in identification of feasible or even preferred solutions being attempted prematurely during MNA. This results in mission need statements that are prepared where a preferred solution has already been identified at the expense of a poorly described mission need. This amounts to a high-risk approach to initiate a new system acquisition program.

Figure 2.4 is a functional flow block diagram which shows the relationship of the MNA process to the remainder of a generic system life-cycle process. As shown in the figure, modules 3.0 and 4.0 correspond to the remaining portions of **FAA's** system life-cycle. However, as shown along the bottom of the figure there is a feedback loop that connects module 4.0 and module 2.0. This loop is regarded to be a significant structural feature of the **MNA** process that provides data and information on the state and condition of the NAS. This information will be needed during MNA in developing a mission capability supply function.

Module 1.0 involves a variety of major factors, other than strictly mission need, that could influence the outcome of MNA. For example, such factors include demands for service, national policies, either as Congressional guidance or as described in existing or new statutes, or the possibilities for new options for satisfying mission needs resulting from technology assessment.

As shown in Figure **2.5a,** the basic idea underlying FAA's concept of a mission need determination process has three components. The first component of the MNA process involves projections of services that FAA will have to provide in satisfying its mission responsibilities now and in the future. Consistent with a planning horizon of 10 to 12 years, it is possible to develop an approximate estimate of FAA capabilities needed to provide projected mission services as required by statutory language. This projection of needed mission capabilities is best thought of

as a demand function of time and is shown as a curve which increases with time to indicate anticipated growth.

As shown in Figure 2.5b, the second component of the MNA process involves projections for services that FAA will be able to provide with planned use of existing facilities and equipment now and in the future. Consistent with this planning, it is possible to develop an appropriate estimate of FAA capabilities that will be available from systems presently in operation and those that are expected to come on line during the planning period. This projection of available mission capabilities is best thought of as a supply function of time and is shown as a curve that decreases with time to indicate wear and tear and technological obsolescence.

As shown in Figure 2.5c, the third component of the MNA process involves comparing the capability demand function with the capability supply function, and from developing a capability shortfall function over the span of the planning horizon. When such a shortfall is identified, it is associated with needed mission services and this information provides the substantive content of a mission need statement.

The definition of specific system acquisitions whether funded by the research, engineering & development (R,E&D) appropriation, or by the facilities and equipment (F&E) appropriation or the Operations appropriation should be based on reduction of a specific increment of the projected mission capability shortfall, within some specified interval of time.

FAA has established a mission needs analysis team (MNAT), lead by AOR-100, to support FAA sponsor organizations by conducting mission needs analysis for each sponsor's organization mission area.

C. Operational Need Description

This section discusses the principle elements that would provide a clear, unambiguous, and complete description of the operational capabilities needed to perform an assigned FAA mission. This description should include the following elements:

- Operational Environment
- Operational Constraints
- Operational Concept
- Measures of Effectiveness
- Performance Attributes & Performance Characteristics
- Time Urgency of Mission Need

The following is a definition of these elements:

- Operational Environment - Description of those conditions that any system concept whose purpose is to satisfy the mission need would observe during operational use

- Operational Constraints - Description of sets of criteria that must be satisfied by any system concept whose purpose is to satisfy the mission need. In particular, these sets of criteria relate to conditions of infrastructure support that may impact on satisfaction of the mission need.

- Operational Concept - Description of how the functionality will be used in the NAS under operating conditions

- Measures of Effectiveness - Description of those "yardsticks" of performance that serve to indicate the degree to which proposed solutions are able to satisfy an identified mission need

  For complex systems it is possible to identify many indicators associated with the functioning of the system. However, not all of these indicators are useful for purposes of evaluating the effectiveness of alternative system concepts in satisfying mission needs.

  In many cases the appropriate Measures of Effectiveness are constructed from various subsets of indicators, that when taken individually are not very informative about the mission effectiveness of the system under consideration.

- Performance Attributes & Performance Characteristics - Identification of those performance parameters which are useful in quantifying needed mission capabilities. Performance characteristics are the desired range of numerical values that the performance attributes may take on.

- Time Urgency of Mission Need - Description of the time-frame within which the capability shortfall must be resolved in order for FAA to accomplish its mission objectives

Mission Need Statement

A mission need statement (MNS) is intended to be a summary document that contains a distillation of comprehensive analysis that has been done to best represent a sponsor's authenticated mission need.

A MNS is required to initiate all system acquisition programs regardless of appropriation. The initial MNS summarizes the results of the mission need analysis. Approval of the MNS constitutes achievement of the KDP-1 milestone. The mission needs analysis team, led by the Operations Research Service and supported by System Engineering organizations, supports the sponsoring FAA operating element having the mission need.

Subsequent updated mission need statements to support KDP-2 through KDP-4 decisions are prepared by the sponsors and program manager, reviewed by the mission need analysis team and System Engineering organizations, and approved by appropriate management levels to reaffirm the need and the associated requirements.

System Requirements

When a mission need statement is approved at KDP-1 the Requirements Determination process continues with the formulation of technical system requirements necessary to support the development of a formal specification for a NAS subsystem.

The initial activity of Requirements Determination during Phase 1 of the acquisition process is to translate the approved mission need statement into a preliminary set of technical requirements. The result of this effort serves as the substantive content of an associated Operational Requirements Document (ORD).

The purpose of the Operational Requirements Document is to document a preliminary set of performance and supportability requirements for a subsystem of the NAS. In developing the ORD for a subsystem of the NAS, the operational requirements for the NAS as a whole, contained in NAS-SR-1000, needs to be taken into account. The Operational Requirements Document will be used as a basis for developing a system level specification, otherwise known as an A-Type specification. In addition to the requirements contained in the ORD, the A-Type specification will contain other requirements developed by the NAS System Engineering Organizations such as Interface Requirements Document(s), Facility Requirements, Verification Requirements, and other requirements imposed by FAA Standards or Orders.

This total set of requirements essentially sets the stage for a large fraction of the activity that follows as the acquisition process continues.

An associated activity of the post KDP-1 technical requirements formulation process is alternative analysis. The purpose of this activity is to assure that a number of appropriate technologies have been identified for examination during Phase 1 of the acquisition process. This includes assuring that a number of system design concepts are developed for each of the appropriate technologies in an effort to identify, in a preliminary manner, the most cost-effective of the solution alternatives.

In subsequent phases of the acquisition process, the system level requirements are transformed into a greater level of detail through iterations of the system engineering process functions of requirements analysis, functional analysis/allocation, synthesis, and system analysis. The output of each system engineering process iteration serves as input to the next iteration. Each application of the system engineering process at succeeding steps results in more detailed NAS element descriptions until production-ready documentation of all subsystem elements is reached and the subsystem is produced.

During the translation of system-level requirements to greater levels of detail, system analysis should be applied continuously and in parallel with the other activities of the system engineering process. This function focuses on assuring that system effectiveness, design-to-cost, and life-cycle cost objectives as well as other factors are taken into account in assessing design alternatives.

The preliminary set of operational performance and supportability requirements documented in the initial Operational Requirements Document are refined in system acquisition phases 2 and 3 as a result of assessing any conflicts that may exist among system requirements, cost-factors, risk factors, system effectiveness, support effectiveness, testing effectiveness, and operational effectiveness. In other words, the operational performance and supportability requirements contained in the initial Operational Requirements Document should not be considered "absolute" in the sense that they should be achieved at any cost.

At the point in the acquisition process where the preferred system solution is selected, usually in phase 2 or 3 of the acquisition process, the NAS baseline documents, NAS-DD-1000 and NAS-SS-1000, are updated via a NAS Change Proposal.

Requirements Traceability

The performance and supportability requirements contained in the Operational Requirements Document should be traceable to the mission need statement and NAS-SR-1000. Other requirements contained in the A-Type specification should be traceable to NAS baseline documentation such as Interface Requirements Documents, FAA engineering standards, applicable FAA Orders and other NAS

baseline documentation. Subsequent detailed specifications (Type B, C, etc.) should be traceable back to the System level specification (Type A) and NAS baseline documentation.

Requirements Changes

Proposed changes to Operational Requirements Documents are approved at Key Decision Milestones 2 and 3. The proposed changes are reviewed by NAS System Engineering organizations to assess the impacts of the proposed requirements changes on the performance of the NAS as a whole. The ORDs are approved by the FAA operational elements, usually Air Traffic, Flight Standards and Airway Facilities.

NAS-SR-1000, NAS-DD-1000, and NAS-SS-1000 are updated as new capabilities are identified and developed, and existing systems are retired. Changes to these baseline documents are processed through the NAS Configuration Management System, Order 1800.8F, which draws on the expertise of various FAA organizations to review proposed changes. The process is initiated when a sponsor prepares and submits a NAS Change Proposal (NCP). The NAS Configuration Control Board (NAS CCB) controls NAS-SR-1000, NAS-DD-1000, and NAS-SS-1000. When an NCP is approved, the change becomes part of the baseline documentation.

NAS System Description Documentation

The NAS system description is documented in NAS-DD-1000 and NAS-SS-1000. These documents define the NAS system-level functional, performance, interface and verification requirements that respond to the overall NAS operational performance and supportability requirements described in NAS-SR-1000. As preferred system solutions are selected during the acquisition process, NAS-DD-1000 and NAS-SS-1000 are updated.

NAS-DD-1000 presents a qualitative, high-level system definition which identifies the allocation of functions to specific subsystems and elements, provides a description of the functional interfaces, and outlines the data flow across each interface.

NAS-SS-1000 is organized into the following six volumes:

- Volume I: General. This volume contains those requirements that are applicable across the entire NAS or are common to two or more subsystems. Appendix I contains the system-level performance requirements. It also contains the verification requirements traceability matrices (VRTM) which are intended for use in Test and Evaluation Master Plans (TEMPs). Appendix II, the NAS Architecture, is a separately bound document which contains the quantity and location of

subsystems and facilities. Appendix III is the NAS Maintenance Support Requirements.

- Volume II: Air Traffic Control Element. This volume is an extension of the applicable requirements contained in Volume I for the air traffic control (ATC) element. It specifically defines requirements at the subsystem level for ATC, flight planning, traffic management, and weather processing functions.

- Volume III: Ground-to-Air Element. This volume is an extension of the applicable requirements contained in Volume I for the ground-to-air element. It specifically defines requirements at the subsystem level for weather sensing, navigation, landing, surveillance, and remote communications functions.

- Volume IV: Communications Element. This volume is an extension of the applicable requirements contained in Volume I for the communications element. It specifically defines requirements at the subsystem level for control, voice switching, data switching, and transmission functions.

- Volume V: Maintenance and Operations Support Element. This volume is an extension of the applicable requirements contained in Volume I for this element. It specifically defines requirements at the subsystem level for remote maintenance monitoring system and system support facility functions.

- Volume VI: Facility Requirements. This volume currently contains the facility requirements and subsystem environmental requirements for the Area Control Facility (ACF) and Airport Traffic Control Tower (ATCT). Future updates will identify requirements for the Automated Flight Service Station (AFSS), remote and unmanned facilities, Metroplex Control Facility (MCF), Local Control Facility (LCF) and facilities related to National Traffic Flow Management.

System Engineering Management

The NAS System Engineering Service (ASE) and the Facility System Engineering Service (AFE) have established System Managers and Associate Program Managers for System Engineering (APMSE) to support FAA system acquisitions. This section describes the role of the System Manager and the APMSE.

A. System Manager

System Managers are appointed to coordinate oversight and planning for selected operational domains and technical initiatives that involve the work of many organizations and interests within the FAA, and the national and international user and supplier communities.

The System Manager functions as the leader and spokesperson for the assigned operational domain or technical initiative within FAA, and on behalf of the United States in international forums. She/he functions as a coordinator of diverse planning, development, and implementation activities within the overall aviation community, and serves to organize special activities needed to resolve issues within this constituency. The System Manager serves as a long-range planner and system "integrator" across the range of activities throughout the domain/initiative life cycle.

The System Manager is expected to have a broad "system perspective", and influence policy development within her/his assigned operational domain or technical initiative. The System Manager does not have direct funding authority, nor does she/he manage acquisition programs. The System Manager is expected to act as an integrative force, and does not normally take adversarial positions.

The System Manager organization consists of the designated System Manager, a Deputy, and a small staff of experts. The System Manager organizes additional operational and engineering teams composed of members of the key FAA organizations having mission responsibilities in the assigned operational domain/initiative. It is these teams that accomplish the bulk of the product for which the System Manager is held responsible.

System Manager products include a Vision Paper, an Operational Concept, a System Plan (outlining the evolution of the domain/initiative), and guidance letters to the responsible organizations.

The following is a brief description of each System Manager's area and points of contact:

1. Oceanic System Manager, ASE-6

The oceanic domain consists of:

- All oceanic and off-shore airspace where New York, Oakland, and Anchorage Air Route Traffic Control Centers currently serve as the oceanic control facilities, and Houston and Honolulu currently provide off-shore control services

- o All functional areas of the system such as automation, communications, navigation, surveillance, airspace, procedures, and people and all phases of the system life cycle

The FAA's oceanic domain is a multifaceted activity that includes automation systems for Air Traffic Control and traffic flow management, **air/ground** voice and data communications, interfacility voice and data communications, dependent surveillance systems, navigation system, airspace, procedures and people. There is a significant need to integrate and coordinate these pieces of the system to realize tangible benefits to the airspace user and controller by the **mid-1990's,** and to provide an evolutionary path to the future. The Oceanic System Manager has the mission of defining and facilitating the evolution of the oceanic system so that user and operator needs are expeditiously met.

Points of contact for the oceanic domain are:

- System Manager - Joseph Fee, ASE-6, 202-287-8608

- Deputy System Manager - Ved Sud, ASE-6.1, 202-287-8609

2. Data Link System Manager, ASE-7

The Aeronautical Data Link System **(ADLS)** domain encompasses all elements required to fully integrate data communications into operations throughout the National Airspace System. These elements consist of: Air Traffic Control and Flight Information Service applications; data link services and communications integrated into existing and evolving ground automation systems; the **air/ground** and supporting **ground/ground** data communications architecture and infrastructure; airborne avionics systems; policies and procedures that enable user benefits through data communications. When these elements are integrated as a system, substantial safety, operational and economic benefits can be provided to the user community, consisting of aircraft operators and airspace managers. There is a growing drive from the aviation industry to implement the ADLS in a timely manner to achieve user benefits. To ensure this need is met by the FAA, the Data Link System Manager:

- o Coordinates across organizational elements and with the external user community to develop an ADLS vision, operational concept, operational requirements, and system plan

- o Coordinates priorities, schedules, plans and budgets to ensure that all necessary elements are aligned and will be available when required

- o Serves as the FAA focal point for coordinating ADLS plans and policies within the FAA, and with external organizations and other civil aviation authorities

Points of contact for the Data Link system domain are:

- System Manager - Hugh McLaurin, ASE-7, 202-287-8783
- Deputy System Manager - Charlotte LaQui, ASE-7, 202-287-8753

3. Satellite Communication, Navigation, and Surveillance System Manager, ASE-8

The Satellite Communications, Navigation, and Surveillance (CNS) System Manager plans and directs the integration of the Satellite Program within FAA and with external agencies to ensure the conversion of operational requirements into effective, efficient, economical, and safe service in the National Airspace System. The Satellite CNS area is comprised of all those activities necessary to define, develop, produce and implement satellite CNS capabilities within NAS.

Points of contact for the Satellite CNS area are:

- System Manager - Mike Shaw, ASE-8, 202-287-8754
- Deputy System Manager - Kan Sandoo, ASE-8, 202-287-8624

4. Traffic Flow Management System Manager, ASE-9

The Traffic Flow Management Domain encompasses all the subsystems - personnel, procedures, automation and communications required for Air Traffic Management to perform the strategic activities related to overall management of air traffic. This includes longer range planning (including modeling and airspace realignments) as well as flow control activities on the day of flight activities. The Traffic Flow Management System(s) must interface with the NAS primarily through the air traffic control automation subsystem, both to obtain flight plan and track data and to provide flow management directives to air traffic control for implementation.

Points of contact for the Traffic Flow Management Domain are:

- System Manager - Mike Ball, ASE-9, 202-287-8575
- Deputy System Manager - Diane Boone, ASE-9.1, 202-287-8616

5. Weather System Manager, ASE-10

The Weather System Manager directs the coordination and integration of all weather and weather support requirements, research, implementation, and activities within the agency and external to the agency including the National Oceanic and Atmospheric Administration (NOAA) and domestic/international aviation weather user groups. Specific activities include long range planning, top level requirements, weather system architecture for support to the NAS, system interfaces and budget prioritization.

Points of contact for the Weather and Weather Support Operational Domain are:

- System Manager - Carl McCullough, ASE-10, 202-287-8595
- Deputy System Manager - Carol Branscome, ASE-10.1, 202-287-7093
- Deputy System Manager - R. Craig Goff, ASE-10.2, 202-287-8642

6. Tower System Manager, AEE-5

The Tower System Manager provides cross service coordination of the Tower domain, including all aspects of system engineering coordination (including equipment and facilities). The Tower System Manager chairs the Tower Matrix Team, represented by nearly every service. The matrix team addresses issues and problem resolution as we evolve to the Tower of the future.

Points of contact for the Tower Domain are:

- System Manager - Jim Lenz, AFE-5, 202-287-8593
- Deputy System Manager - Larry Deibel, AFE-5, 202-287-8782

7. Airport Surface System Manager, AFE-6

The Airport Surface System Manager is responsible for system integration and the system architecture necessary for movement of aircraft and ground vehicles on the airport surface. Areas include airport design and operations issues, landing aids, surveillance, and surface automation. The Airport Surface System Manager is also responsible for linkages between airport and facilities and equipment (F&E) capital development planning and coordination. The Airport Surface System Manager also is the program manager for the FAA's runway incursion program.

Points of contact for the Airport Surface Domain are:

- System Manager - Mike Harrison, AFE-6, 202-287-7096

B. Associate Program Manager For System Engineering

The Associate Program Manager for System Engineering (APMSE) addresses system-level issues associated with project requirements, and project interfaces with other NAS subsystems. The APMSE participates in matrix management team meetings, and is responsible for acting on behalf of, and representing the program manager (PM) to the ASD system engineering support organizations concerning the conduct of required system engineering activities. As the designated representative to the PM, the APMSE acts as the system engineering support focal point for:

- o Clarification, analysis, and update of NAS system-level baseline requirements (contained in NAS-SR-1000, NAS-DD-1000, NAS-SS-1000, and Interface Requirements Documents) which serve as a basis for the project and its next key decision point (KDP); and, the analysis of new, or proposed NAS system-level changes that have been identified since the project was initiated at KDP #1

- o Refinement of developmental requirements for new NAS subsystems, and improvements to existing NAS subsystems to assure that research and development (R&D) products are successfully integrated into the NAS

- o Provision of information on, and assistance with, system engineering practices, procedures, and policies; including engineering specialties, software engineering, and configuration management

- o Requests for and provision of cost/benefit analyses by AOR, and facility system engineering support by AFE, to include the coordination of facility requirements, beginning with the timely development and approval of facility Interface Requirements Documents and continuing through the project's deployment phase

- o Update of the mission needs analysis (documented in the Mission Need Statement) that serves as a basis for KDP's 2, 3, and 4, as required

- o Input to, and review of, project engineering documentation (e.g., specifications, SOWs, RFPs, MTPs), NAS and engineering change proposals (NCPs and ECPs), and other NAS subsystem documentation for conformance with system engineering policies, standards, and baseline specifications

- Provision of technical support from ASE, AOR, and AFE functional divisions to resolve specific project needs
- Resolution of system issues that arise in connection with development and implementation of a specific project
- Assessment of related functional area projects to assure consistency among functional and performance requirements, and project interdependencies
- Provision of information on the strategic planning for the evolution of the NAS
- Participation in market research efforts to determine applicability of commercial off-the-shelf/non-developmental items (COTS/NDI) to meet project requirements

The APMSE points of contact are listed below:

Support Area	APMSE	Telephone
Advanced Automation	John Scardina, ASE-100	287-8611
En Route Automation/TMS	John Kefalotis, ASE-100	646-2098
Oceanic	Jim Wetherly, ASE-100	287-8618
Terminal Automation/ARTS II	Mike McVeigh, ASE-100	287-7115
Terminal Automation/ARTS III	Mike McVeigh, ASE-100	287-7115
Flight Service Stations	George Barboza, ASE-100	287-8614
Weather Processors	Vince Schultz, ASE-100	287-8620
Weather Sensors	Michael Porter, ASE-100	287-8619
Weather/AWPG	Vince Schultz, ASE-100	287-8620
Weather/ITWS	Michael Porter, ASE-100	287-8619
TATCA	John Kefalotis, ASE-100	646-2098
Airport Surface	Jay Merkle, ASE-100	287-8759
Data Link/Applications	Kevin Grimm, ASE-100	287-8752
Data Link/Communications	Rus Zub, SEIC	646-2251
Satellite/Communications	Greg Burke, ASE-200	287-8628
Satellite/Navigation	Charles Rosario, ASE-300	287-8637

Support Area	APMSE	Telephone
Non-ACF Voice Switches, Recorders; ETVS, ICSS, STVS, RDVS, HCVR, TVSR	Maj Sheila Giscombe, USAF. ASE-200	287-8652
Air/Ground Communications, Gulf of Mexico; RCE, Emergency Transceivers, RFI Elimination, Transceiver Replacement, BUEC	Hoang Tran, ASE-200	287-8626
Interfacility Communi-cations; DLP 1 & 2, NADIN II, RCL, LDRCL, RCR, DMN, INMS	Dawn Abel, SEIC	646-5322
ACF Voice Switches/ Voice Switching and Control System (VSCS)	Pete Holleran, SEIC	646-5619
Distance Learning System	Terry Wendel, ASE-200	287-8627
Landing Systems	Tom Laginja, ASE-300	287-8635
Navigation Systems	Greg Joyner, ASE-300	287-8634
Terminal Radar/ASR-9, TRDRE	Jim Chen, ASE-300	287-8636
Terminal Radar/ASDE-3	Charles Rosario,ASE-300	287-8637
Secondary Radar	Doug Hodgkins, ASE-300	287-8633
En Route Radar/ARSR-4	Jim Chen, ASE-300	287-8636
Weather Radar	ASE-300	287-8630
Terminal Sensors (R&D)	Jim Chen, ASE-300	287-8636
Maintenance Automation Program	John Snow, ASE-600	287-7114

Lessons Learned

Mission need statements are viewed as instruments for obtaining funding rather than providing the information relevant to support the key decision point process.

Many mission need statements are written to support specific technologies or solutions rather than describing the operational capability shortfall that needs attention.

System performance requirements are easy to defend when they have an operational and analytic basis.

Skipping steps in the acquisition process results in significant rework, cost overruns and schedule delays.

70% to 80% of a system's life cycle cost is the result of decisions made early—on in the acquisition process.

Focusing on finding the optimal solution to a vaguely stated problem description is a mistake. It results in increased requirements changes, increased cost and schedule slips.

Process and product are inseparable.

PM's should contact the APMSE immediately after becoming aware of problems in the system requirements area so that a timely resolution can be accomplished.

Major conflicts and disconnects are minimized with proper coordination between FAA operating elements, project offices, and System Engineering offices.

The requirements process should be followed so that NAS requirements are consistent and traceable from conception through implementation.

Responsibilities

Needs identification and requirement responsibilities are assigned as follows:

- Air Traffic and Flight Standards - Responsible for identifying operational needs and operational requirements
- NAS Operations Service (AOP) - Responsible for identifying telecommunications management and operations needs
- NAS Transition and Implementation Service (ANS) - Responsible for identifying transition and implementation requirements
- Operational Support Service (AOS) - Responsible for identifying second level maintenance requirements for operational/support software and hardware brought into the NAS

- Requirements and Life-Cycle Management Service (ALM) - Responsible for NAILS requirements, assessing system performance and supportability and providing this information to FAA's mission need analysis process

- Operations Research Service (AOR) - Responsible for the mission needs analysis team (MNAT) that supports sponsoring organizations' development of mission need statements and performing mission area analysis to identify and forecast operational needs. In addition, AOR is responsible for cost estimating and benefit/cost analyses.

- NAS System Engineering (AFE and ASE) - Responsible for supporting the mission need analysis team and supporting sponsoring organizations in transforming an approved mission need into an Operational Requirements Document, and allocation of those requirements as indicated below:

  [] Facility System Engineering (AFE)

  AFE is responsible for providing system engineering direction for the integration of NAS equipment into FAA facilities; developing space, electrical, and heating, ventilation, and air conditioning (HVAC) requirements; developing generic facility designs; maintaining configuration control of facility-to-subsystem IRDs and Volume VI of NAS-SS-1000; serving as co-chair of the NAS Facilities Configuration Control Board (ANFCCB); developing facility-related FAA standards, specifications and orders; ensuring that facilities, as systems, are responsive to the FAA and end user needs; providing facility-related support to NAS program managers; and support Capital Investment Plan activities related to facilities

  - AFE-100 is responsible for Air Route Traffic Control Centers (ARTCC), Area Control Facilities (ACF), Metroplex Control Facilities (MCF), Flight Service Stations (FSS), facilities related to National Traffic Flow Management, unmanned facilities, and the Facility System Analysis Tool (FSAT) Radar Approach Control (TRACON) (Metroplex) control facilities

  - AFE-200 is responsible for Airport Traffic Control Towers (ATCT); Terminal Radar Approach Control Facilities (TRACON); Local Control Facilities (LCF); electrical systems, HVAC systems; facility

configuration management; support of Department of Defense base closure activities; human factors, environmental, energy and safety issues; the Power System Analysis Tool **(PSAT);** and facility-related standards, specifications, and orders

[] NAS System Engineering **(ASE)**

ASE is responsible for system-level requirements, functional requirements, interface requirements, performance requirements, communications standards, engineering standards and the maintenance of NAS-SR-1000, NAS-DD-1000, and **NAS-**SS-1000 (Volumes I through V)

- ASE-100 is responsible for automation and weather systems engineering
- ASE-200 is responsible for communications systems engineering, communications and protocol standards, and the communications portion of Interface Requirements Documents
- ASE-300 is responsible for systems engineering in the areas of surveillance, navigation and landing systems
- ASE-600 is responsible for engineering specialties, interface management, test and evaluation policy, NAS software engineering, the Maintenance and Operations support element and updates NAS-SR-1000, NAS-DD-1000 and NAS-SS-1000 based on approved NAS Change Proposals
- **ASE-3** is responsible for NAS Configuration Management, the Specification Review board, ensuring the integrity of NAS System Engineering Service support for FAA's acquisition process, and the development and application of sound system engineering polices and procedures for NAS evaluation

o Program Managers

Program managers are responsible for ensuring that subsystem performance and functional requirements are traceable to mission need statements, operational requirements documents, and NAS baseline documents NAS-SR-1000, NAS-DD-1000, and NAS-SS-1000; other requirements should be traceable to the applicable standards and orders

Review and Approval

The following requirements-related items are reviewed and approved as follows:

- Mission Need Statement - Review and approval per Order 1810.1F, Acquisition Policy
- NAS-SR-1000 Changes - Review by "must evaluators" and approval by the NAS Configuration Control Board (CCB) (NCP is required)
- NAS-DD-1000 Changes - Review by "must evaluators" and approval by the NAS CCB (NCP is required)
- NAS-SS-1000 Changes - Review by "must evaluators" and approval by the NAS CCB (NCP is required)
- Engineering Standards (New) - Review by SRB members and approval by the NAS CCB (NCP is required)
- Engineering Standards Changes - Review by "must evaluators" and approval by the NAS CCB (NCP is required)
- IRDs and Facility IRDs - See Chapter 12, Interface Management
- Project Specifications (New) - Review and endorsement by the SRB and approval by the acquisition office CCB (NCP is required)
- Project Specification Changes - Review by "must evaluators" and approval by the cognizant acquisition office CCB (NCP is required)

Contacts

The following organizations may be contacted for additional information in the areas indicated:

- System Engineering Process, ASE-3.1, 202-287-8603
- Mission Need Analysis Team, AOR-100, 202-287-8767
- Mission Need Statement Development, AOR-100, 202-287-8767
- Benefit/Cost Analyses, Cost Estimating, AOR-100, 202-287-8509

System Requirements, System Design, **MNA** Team Support (Review of mission need statements), Operational Requirements Documents, Interface Requirements Documents

- Automation & Weather, ASE-100, 202-287-8611
- Communications, ASE-200, 202-287-8621
- Surveillance, ASE-300, 202-287-8630
- Navigation & Landing, ASE-300, 202-287-8630
- Maintenance & Operations, ASE-600, 202-287-8644
- Engineering Specialties, ASE-600, 202-287-8644
- Software Engineering, ASE-600, 202-287-8646
- Facilities: ARTCC/ACF/MCF/FSS/Other, AFE-100, 202-287-8580
  Facilities: **ATCT/TRACON/LCF,** AFE-200, 202-287-8583

IRD Interface Management Process, ASE-600, 202-287-8655

Facility **IRDs**

- ARTCC/ACF/MCF/FSS/Other, AFE-100, 202-287-8580
- ATCT/TRACON/LCF, AFE-200, 202-287-8583

NAS Baseline Document Updates, ASE-600, 202-287-8644

NAS-SR-1000, NAS-DD-1000 & NAS-SS-1000 **(Vols.** I through **V)**

- Automation & Weather, ASE-100, 202-287-8611
- Communications, ASE-200, 202-287-8621
- Surveillance, ASE-300, 202-287-8630
- Navigation & Landing, ASE-300, 202-287-8630
- Maintenance & Operations, ASE-600, 202-287-7114

NAS-SS-1000, Volume VI

- ARTCC/ACF/MCF/FSS/Other, AFE-100, 202-287-8580
- ATCT/TRACON/LCF, AFE-200, 202-287-8583

Engineering Standards, ASE-600, 202-287-8644

Facility Engineering Standards, AFE-200, 202-287-8583

Communications & Protocol Standards, ASE-200, 202-287-8621

NAS Software Standards, ASE-600, 202-287-8646

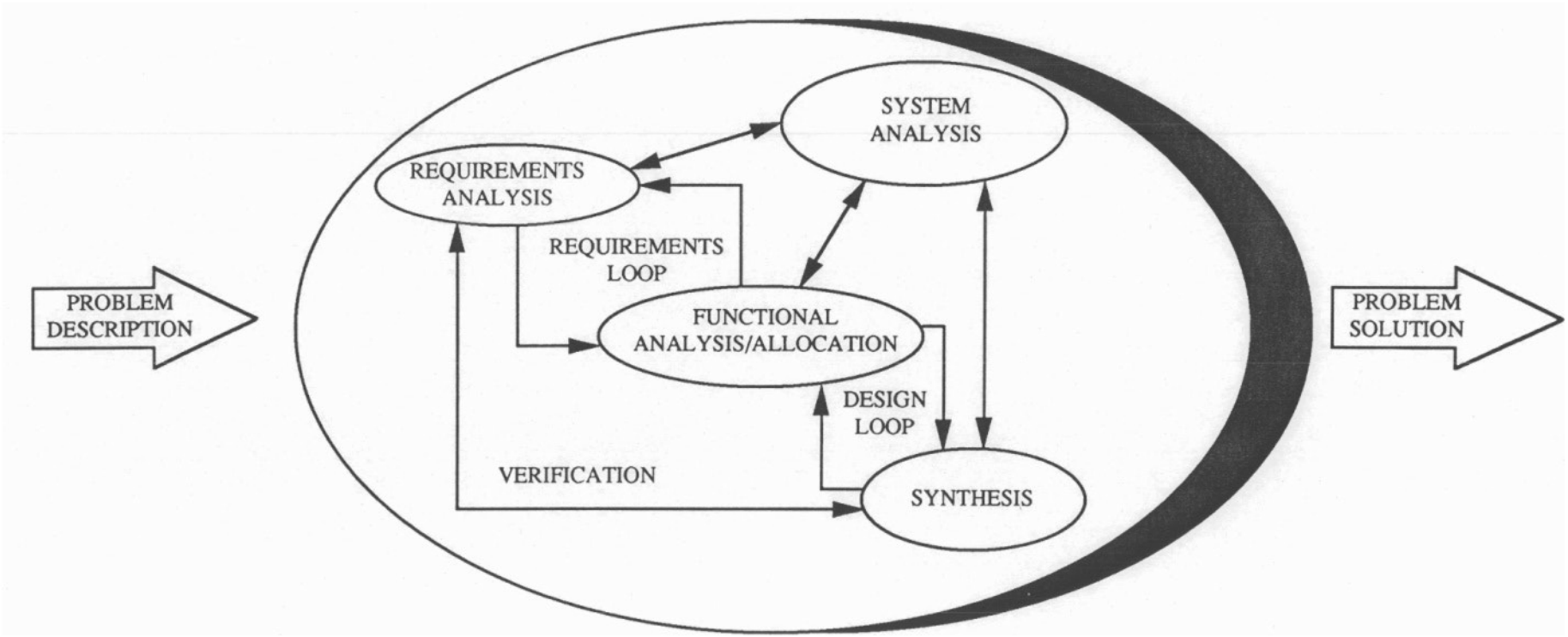
Reference Documents

The following documents are the basis for the guidelines presented:

- Order 1320.1D, FAA Directives System
- Order 1800.8F, NAS Configuration Management
- Order 1810.1F, FAA Acquisition Policy
- NAS-SR-1000, NAS System Requirements Specification
- NAS-DD-1000, NAS Level I Design Document
- NAS-SS-1000, NAS System Specification

Point of Contact for Chapter 2 is Joseph DeMeo, ASE-3, 202-287-8602.

MAJOR SYSTEM ENGINEERING PROCESS ELEMENTS



FIGURE

SYSTEM ENGINEERING & THE A-109 SYSTEM ACQUISITION CYCLE

SYSTEM ACQUISITION CYCLE PHASES	PHASE 0 MISSION NEED DETERMINATION	PHASE 1 CONCEIT EXPLORATION, ALTERNATIVES ANALYSIS	PHASE 2 DEMONSTRATION & VALIDATION	PHASE 3 FULL SCALE DEVELOPMENT	PHASE 4 PRODUCTION & DEPLOYMENT	PHASE 5 OPERATIONS & MAINTENANCE
DECISION POINTS	CONCEPT STUDIES APPROVAL	CONCEPT DEMONSTR. APPROVAL	DEVELOPMENT APPROVAL	PRODUCTION APPROVAL	MODIFICATION APPROVAL (AS REQUIRED)	SYSTEM RETIREMENT APPROVAL
MAJOR SYSTEM ENGINEERING OBJECTIVES	◦ TO IDENTIFY DEFICIENCIES IN EXISTING MISSION CAPABILITIES ◦ TO DETERMINE MORE EFFECTIVE MEANS OF PERFORMING ASSIGNED TASKS WITHIN ASSIGNED MISSION AREAS ◦ TO DEVELOP MISSION NEW STATEMENT	◦ TO EXPLORE ALTERNATIVE SYSTEM CONCEPTS ◦ TO IDENTIFY FEASIBLE, AFFORDABLE RANGES OF COST AND SYSTEM EFFECTIVENESS a TO IDENTIFY SYSTEM CONCEPT(S) FOR FURTHER DEVELOPMENT ◦ TO PREPARE PROGRAM DOCUMENTATION NECESSARY TO SUPPORT THE NEXT PHASE	◦ TO DEMONSTRATE FEASIBILITY OF SELECTED SYSTEM DESIGN CONCEPTS ◦ TO ASSESS PROGRAM RISKS OF SUBSYSTEMS ◦ TO DETERMINE IF IT IS APPROPRIATE TO PROCEED TO FULL-SCALE DEVELOPMENT ◦ TO UPDATE PROGRAM DOCUMENTATION TO SUPPORT THE NEXT PHASE	◦ TO DEVELOP DETAILED DESIGN NECESSARY TO GO TO FULL RATE PRODUCTION ◦ TO DEVELOP TESTED DESIGN THAT MEETS REQUIREMENTS ◦ TO UPDATE PROGRAM DOCUMENTATION TO SUPPORT THE NEXT PHASE	◦ TO PRODUCE A SYSTEM THAT PRODUCES THE DESIRED PERFORMANCE WITHIN COST AND SCHEDULE CONSTRAINTS ◦ TO PROVIDE ADEQUATE EQUIPMENT AND DOCUMENTATION TO SUPPORT THE SYSTEM IN THE FIELD	◦ TO SUPPORT FIELDED SYSTEMS WITH TOOLS, SPARE PARTS, AND TECHNICAL DOCUMENTATION ◦ TO MONITOR AND EVALUATE SYSTEM PERFORMANCE ◦ TO INTRODUCE MODIFICATIONS AND PRODUCT IMPROVEMENTS AS NECESSARY
REQUIREMENTS DETERMINATION PROCESS	◦ THE PRINCIPAL ELEMENT OF THE REQUIREMENTS DETERMINATION PROCESS IN THE INITIAL PHASE OF THE ACQUISITION CYCLE IS MISSION NEED ANALYSIS ◦ THE REQUIREMENTS DETERMINATION PROCESS IS EVOLUTIONARY AND ITS ACTIVITIES ARE PERFORMED IN SEVERAL PHASES OF THE SYSTEM ACQUISITION CYCLE	◦ TRANSLATE APPROVED MISSION NEED INTO A PRELIMINARY SET OF TECHNICAL REQUIREMENTS. THIS PROVIDES THE SUBSTANTIVE CONTENT OF AN ASSOCIATED OPERATIONAL REQUIREMENTS DOCUMENT. ◦ OPERATION REQUIREMENTS DOCUMENT (ORD) - DOCUMENTS A PRELIMINARY SET OF PERFORMANCE AND SUPPORTABILITY REQUIREMENTS FOR A SUBSYSTEM OF THE NAS ◦ DEVELOPMENT OF SYSTEM-LEVEL SPECIFICATION (TYPE A) USING ORD AS BASIS ◦ DEVELOP INTERFACE REQUIREMENTS DOCUMENT(S)	◦ TRANSFORM SYSTEM-LEVEL REQUIREMENTS TO CONFIGURATION ITEM LEVEL ◦ UPDATE THE ORD ◦ INITIATE PREPARATION OF DEVELOPMENT SPECIFICATION (TYPE B) ◦ UPDATE NAS BASELINE DOCUMENTATION	◦ TRANSFORM REQUIREMENTS AT CONFIGURATION ITEM LEVEL TO NEXT LOWER LEVEL TO SUPPORT DETAILED DESIGN ACTIVITIES ◦ UPDATE ORD ◦ PREPARE PRODUCT SPECIFICATION (TYPE C) ◦ UPDATE NAS BASELINE DOCUMENTATION AS REQUIRED	◦ FINALIZE PRODUCT, PROCESS AND MATERIAL SPECIFICATIONS ◦ EVALUATE CHANGE PROPOSALS FOR DEFICIENCY CORRECTION ◦ BASELINE PRODUCT SPECIFICATION AND INITIATE CONFIGURATION CONTROL DOCUMENTS	◦ ASSESS NAS SUBSYSTEM PERFORMANCE ◦ EVALUATE CHANGE PROPOSALS FOR SYSTEM MODIFICATIONS/ IMPROVEMENTS ◦ PROVIDE FEEDBACK TO MISSION NEED ANALYSIS WITH REGARD TO SYSTEM PERFORMANCE

FIGURE 2.2

NAS PROBLEM DEFINITION AND PROBLEM SOLUTION DOMAINS

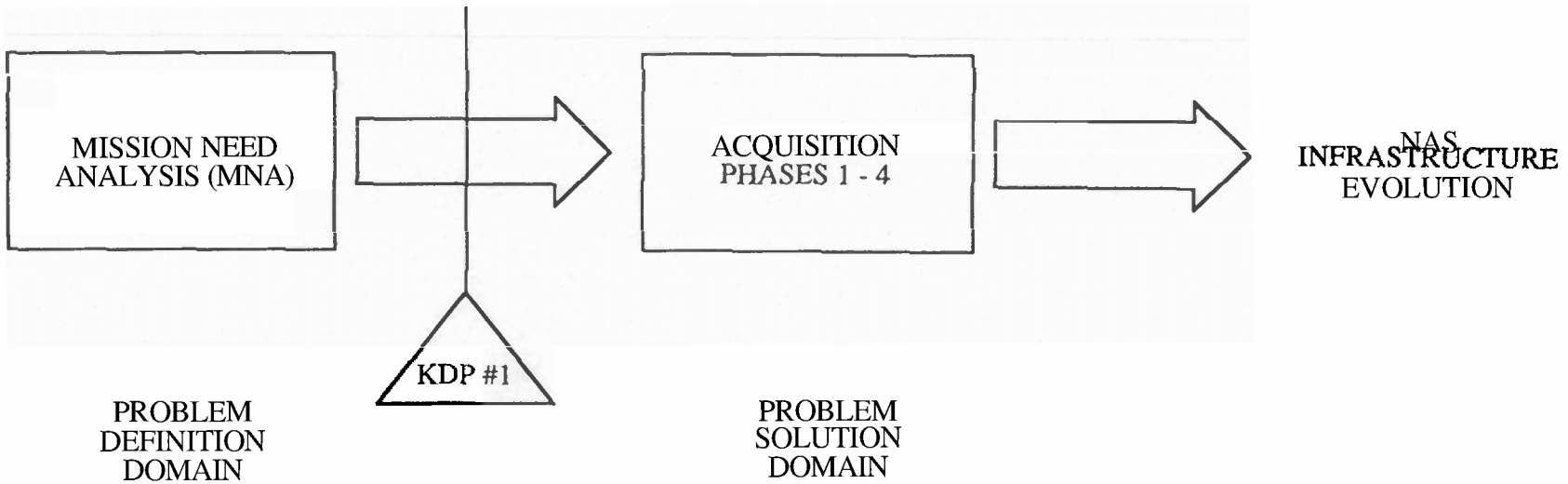


FIGURE 2.3

NEED DRIVEN MNA PROCESS

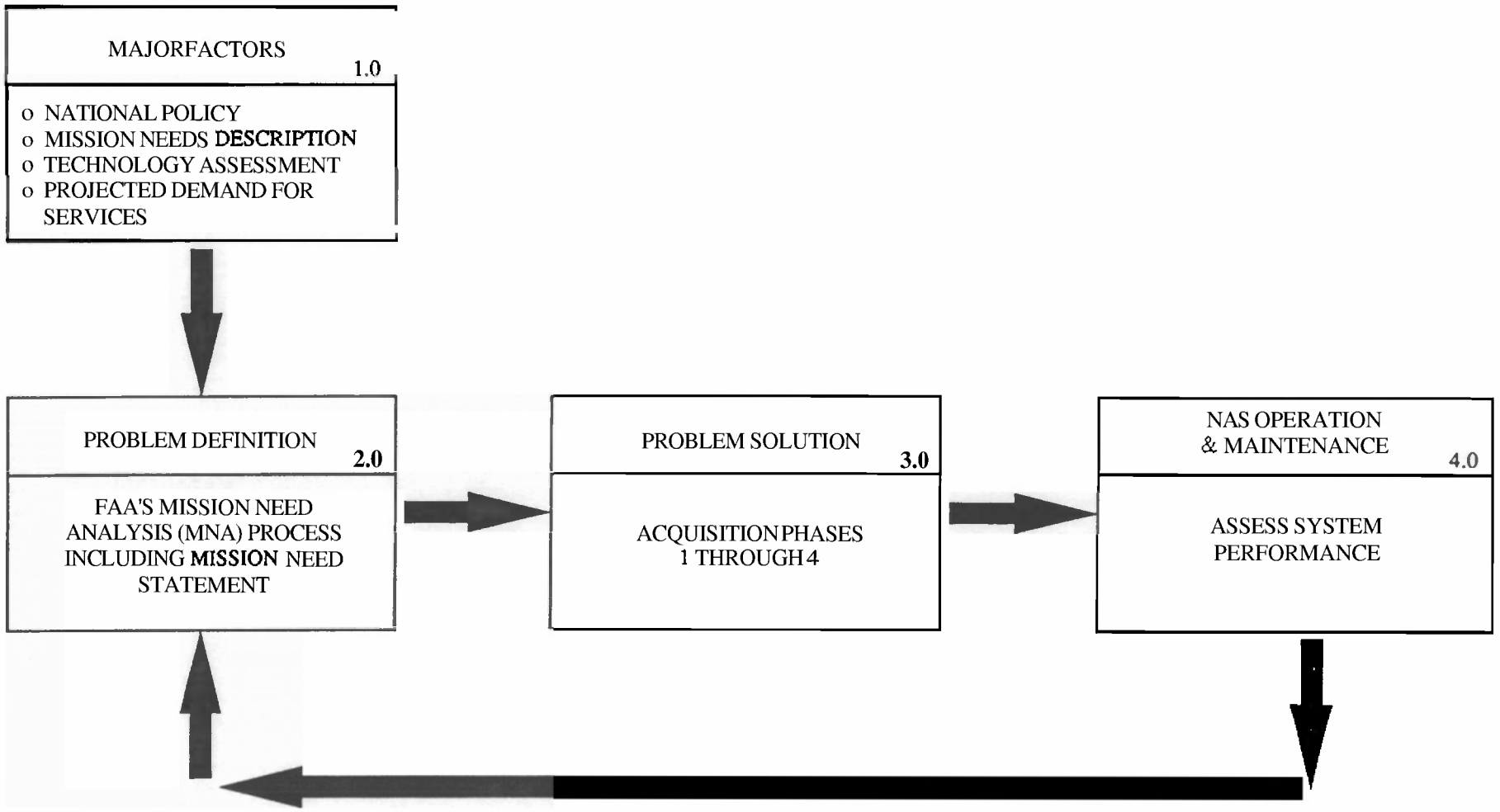
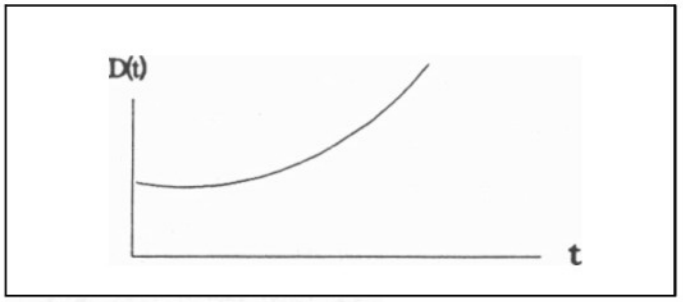
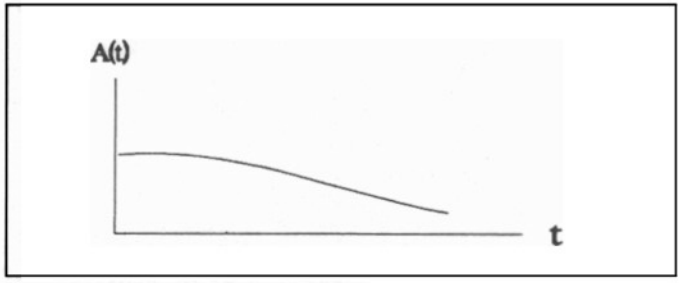


FIGURE 24

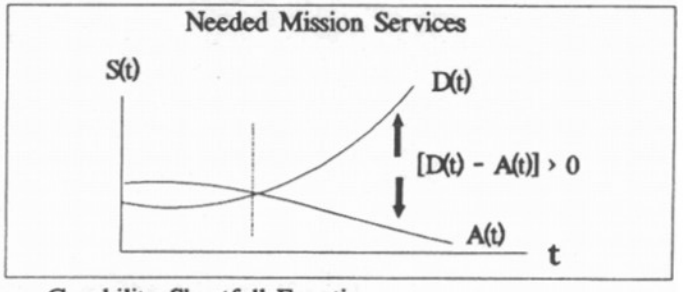
STRUCTURED APPROACH TO PROBLEM DEFINITION



a. Capability Demand Function



b. Capability Supply Function



c. Capability Shortfall Function

Chapter 3

Research, Engineering And Development (R,E&D) Plan

Background

The Research, Engineering and Development (R,E&D) Plan describes the FAA's efforts to develop technologies that address both current and projected National Airspace System (NAS) issues so that our Nation can maintain a competitive, robust aviation infrastructure. The Plan outlines individual projects that may lead to new systems for NAS implementation. However, the R,E&D Plan is not the vehicle for putting new systems into the NAS, that function is accomplished by the Capital Investment Plan. The R,E&D program's purpose is to determine solutions for defined problems and develop the selected technology to the point that it is a viable system. The project is then transitioned to the Capital Investment Plan for future NAS implementation.

Changing operational mission needs for the NAS and revised FAA strategic policy guidance frequently result in new R,E&D requirements. Therefore, the Plan and the process that supports it is evolutionary rather than static. As additional needs are identified, new candidate projects will be created, submitted for validation and approval, then processed through the budget cycle. The mechanism used to identify and process these new requirements is the Mission Needs Statement (MNS) with associated Research Project Initiatives (RPI). Since annual authorization levels establish the upper limit of R,E&D funding, new and existing projects must compete to produce the FAA's priority items for the annual budget submission.

MNS/RPI Process Summary

The MNS process is the mechanism used to get new projects into the R,E&D program when a shortfall in existing capability has been identified. Candidate projects that do not have an MNS will not be considered for funding. Figure 3.1 shows the MNS approval process leading to Acquisition Review Council KDP-1 approval for projects with a total cost greater than $50 million or that have a Facilities and Equipment (F&E) funding component. Those projects requiring only R,E&D resources with a total cost less than $50 million will only require Service Director approval.

When putting together an MNS/RPI package it is important to remember that the MNS should document a shortfall in capability, i.e., a problem. The associated RPIs should describe the R,E&D activities that will be investigated in an attempt to solve the stated problem. A common deficiency in past MNS packages is that they focused too much on a particular technology or solution alternative without describing a problem. The research project, not the MNS package, is tasked with determining what technology or solution is best based on quantitative data after examining all the alternatives. FAA Order 1810.1F provides a detailed description preparing MNSs and the MNS process.

R,E&D Process Summary

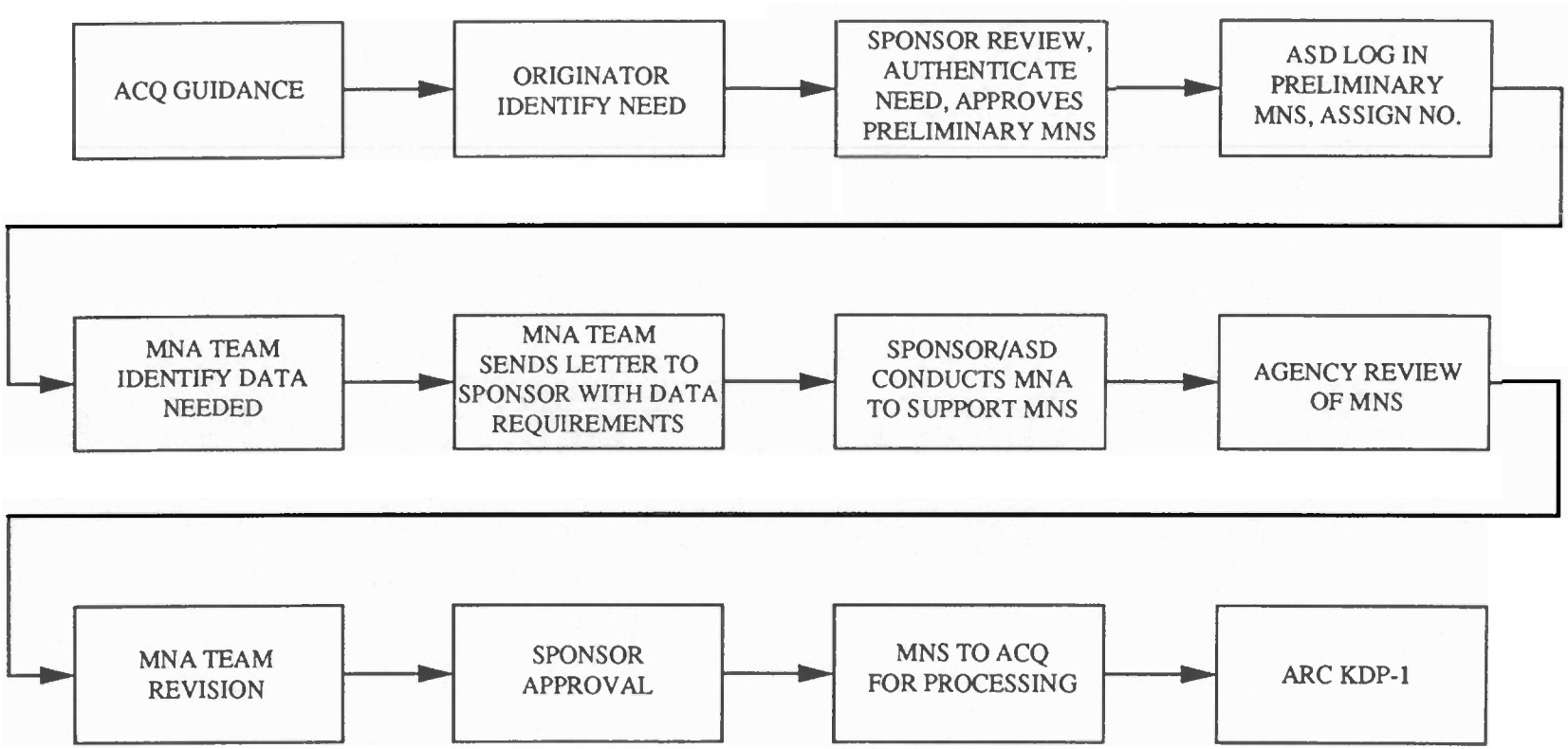
This section provides a brief overview on the R,E&D budgeting process. Figure 3.2 is a highly condensed guide showing the major steps required to develop resource allocations for the R,E&D budget. The Resource Allocation Subcommittee (RAS) develops system issues designed to solicit broad, top down policy guidance from the Steering Committee or upper management as appropriate. The system issue guidance is then applied to existing R,E&D programs and new MNSs. The chapter managers develop recommendations for project funding based on the allocations the RAS set for their chapters. These recommendations are reviewed by the RAS and sent to the Steering Committee for final approval.

R,E&D Plan Development Cycle

R,E&D Plan development begins in April after the budgeting process and Congressional appropriations hearings are completed. There is only one draft produced before a final draft is sent for upper management review. To produce draft 1 APM-300 will contact the managers for new and existing projects to schedule a R,E&D Plan project description development/review session. At these sessions APM will explain the requirements the project description needs to fulfill and assist the program managers in developing a description for new projects or editing the description for existing projects. The R,E&D Plan is a high-level document designed to give a basic overview of the FAA's entire R,E&D program to a non-technical audience. Once draft 1 is completed it will be distributed to the Associate Administrators for agency-wide review. All comments received will be coordinated through the program managers before being incorporated into the final draft. The final draft then enters upper management review by AOA-3, AOA-2, and AOA-1 before being sent for OST/OMB review. When the plan finishes the OST/OMB review it is processed through AOA-3, AOA-2, and AOA-1 for final signature and publication.

The point of contact for Chapter 3 is Kevin Bridges, APM-300, 202-287-8722.

MISSION NEED STATEMENT (MNS) DEVELOPMENT PROCESS



FIGURE

R,E&D RESOURCE ALLOCATION PROCESS

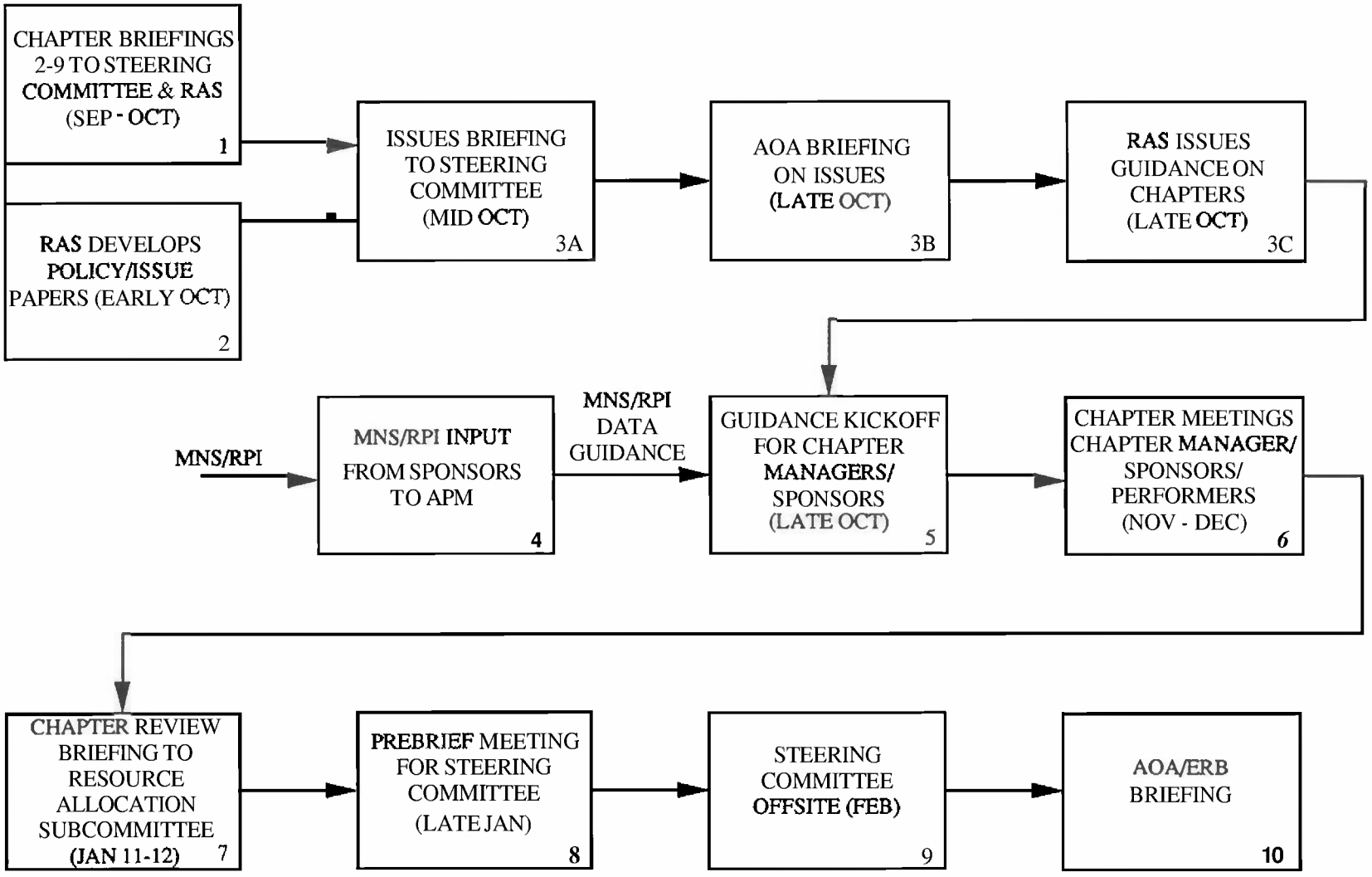


FIGURE 3.2

Chapter 4

Capital Investment Plan

Background

The Capital Investment Plan (CIP) summarizes Facilities and Equipment (F&E) programs that the FAA intends to pursue over a 15 year planning horizon in addressing key concerns of the National Airspace System (NAS). The CIP embodies the phased plan for evolution of the existing NAS through an orderly deployment of new products and technologies to meet mission need. New F&E programs are identified through a continuous process of mission need analysis which leads to development/approval of a mission need statement (MNS). Approved MNS then enter the competition with existing programs for F&E funding each year, in the F&E budget process. Major CIP program objectives are to:

1. Provide for growth through expansion, relocation, or consolidation of F&E

2. Refurbish structures, replace obsolete equipment, or relocate facilities to maintain service, improve effectiveness, and/or reduce cost

3. Provide spares, train personnel, and manage the human aspect of modernizing the NAS

4. Add new capabilities to the System

The F&E budget process is closely interwoven with CIP development and annually allocates resources according to the approved Capital Investment Plan. By updating the CIP and formulating the F&E budget concurrently, the FAA ensures its scarce resources are targeted at the most critical mission needs.

Overall CIP Development Process

A new process for capital investment planning linked to budget development has been developed (see Figure 4.1). The new process involves three major sequential phases of planning and budget development: (1) initial policy guidance, which is provided top-down by the Administrator and CIP Steering Committee (Associate level), especially as to the resolution of major system-level issues affecting the future NAS architecture; (2) system engineering/operational analysis. Using the top-down guidance, Functional Working Groups (FWGs) develop evaluations of all

CIP/F&E projects within their respective functional areas and a System Engineering/Operational Analysis Team (SEOAT) (Service Director Level) develops an FAA-wide Resource Allocation of all CIP/F&E projects; and (3) the EWG under the SEOAT allocate F&E resources to individual CIP projects according to their corporate evaluation and their executability for the F&E budget planning year. FWG members are assigned by the SEOAT.

The 1994 CIP planning and the FY 1996 budget processes began with the late July notification of a submittal deadline for preliminary MNSs (see Figure 4.1), which was just a reminder of the October 15 deadline for submittal for the planning year; it is not a starting point. Inputs (MNSs, FBCNs, and NCPs) should be processed throughout the year. Those inputs which identify new funding requirements above the current CIP baseline and requesting FY 1996 funding were due to APM by October 15, 1993. In September, ABU initiated a budget Call for early submission by program offices and regions. In the "early" submission, program offices were required to submit FY 1996 F&E resource requirements sorted by work breakdown structure (WBS) elements. Also, in November, regions submitted only a prioritized list of specific sites to be evaluated for national program funding (e.g., ATC Modernization). The early-submission data received from the call will be used for both the 1994 CIP planning and the FY 1996 budget process.

The planning and resource allocation process will be developed in three phases (see Figure 4.2). In Phase I the CIP Steering Committee and Administrator will decide on major system-level issues initially collected by the SEOAT, and develop guidance for Phase II. In Phase II, all projects in the CIP will be rated and evaluated by their ability to achieve Agency goals and their contribution to resolving the system-level issues. No funding will be considered during the first two phases. All new Mission Need Statements (MNSs), Financial Baseline Change Notices (FBCNs), and NAS Change Notices (NCPs) requirements for FY 1996 will be evaluated during the second phase and their funding levels incorporated into the financial baseline to be used during the third phase of the process. The Third phase will develop the funding profiles for all projects and the final CIP financial baseline.

First CIP Steering Committee Conference

The first CIP Steering Committee Conference will be held at or near FAA Headquarters. At this conference, the major issues will be reviewed and approved, and the Associate Administrators will collectively review and discuss changes submitted through the MNS, NCP, and FBCN processes. After the conference, the Associate Administrator for Systems Engineering and Development, ASD, will revise the major issues (as required) and forward to the FAA Administrator for final approval. The Administrator

approved major issues will be provided to the SEOAT and FWGs for rating the CIP projects.

Initial Draft of CIP

The initial draft of the new CIP will use the last published CIP as a starting point. Projects which have been completed since the publication of the last CIP will be deleted. Each project remaining in the plan will be updated by APM-300 through interviews with the program managers. CIP project milestones will also be updated as appropriate through APM-300 conducted joint reviews with the program managers. These reviews will update the milestones to incorporate OMB and congressional actions on the budget. Project descriptions will be developed for MNSs approved by the ARC and those which are expected to be scheduled for an ARC decision by mid-February. New project descriptions will be based on the information provided in the MNS in coordination with the MNS originator and sponsor.

Chapter one and the other chapter introductions will be updated by APM-300 in coordination with personnel in key specialty areas. In addition, applicable strategic information developed during SEOAT and FWG deliberations will be included. To facilitate the review process, new and deleted text will be identified using underlining and strikeouts. The initial draft will be distributed for associate level review in January, well before the second CIP Steering Committee Conference offsite.

Second CIP Steering Committee Conference

This offsite conference is held to report on the actions taken by the FWG and the SEOAT, and to align the F&E funding profile with the CIP projects. The conference agenda will include briefings by the FWG and SEOAT on CIP ranking, content, and issues; a status report from ACQ on all Mission Need Statements; a briefing by the NAS Planning Division on the status of the draft CIP and changes made since the previous issue; F&E budget status; and briefings by the DOD and the Regions, as required. The Regions have the opportunity to express their views on any issues related to the CIP through their NAS/CIP coordinators. This is the forum to resolve any issue resulting from changes to Draft 1 and to surface new issues.

Final Draft of CIP

The final draft of the CIP will be a thoroughly coordinated document that will be reviewed and approved by the Administrator. This draft will then be submitted along with the budget to the Office of the Secretary of Transportation (OST). It will include comments from the initial Draft, results of funding adjustments, and approvals of Mission Need Statements. All technical, cost, and schedule data will be coordinated and be in alignment for

this draft. In addition, the final draft will be used as the vehicle to accomplish the following:

A. **ADA/AOA** Review: Review of the CIP by the Deputy Administrator (ADA-1) and the Administrator **(AOA-1)** will be accomplished using this draft. The Administrator will be briefed on all new CIP initiatives and other significant factors, so that his policy decisions can be reflected in the OST budget.

B. Schedule Validation: During the preparation of the final draft, there will be a CIP schedule validation and approval of all CIP project milestones. This validation and approval will be conducted by a joint coordinated effort among the Associate Administrators and their various Service Directors, Program Directors, and the Division and Branch Managers. The CIP schedule database will be updated with the approved schedules.

Camera Ready **Copy** of the CIP

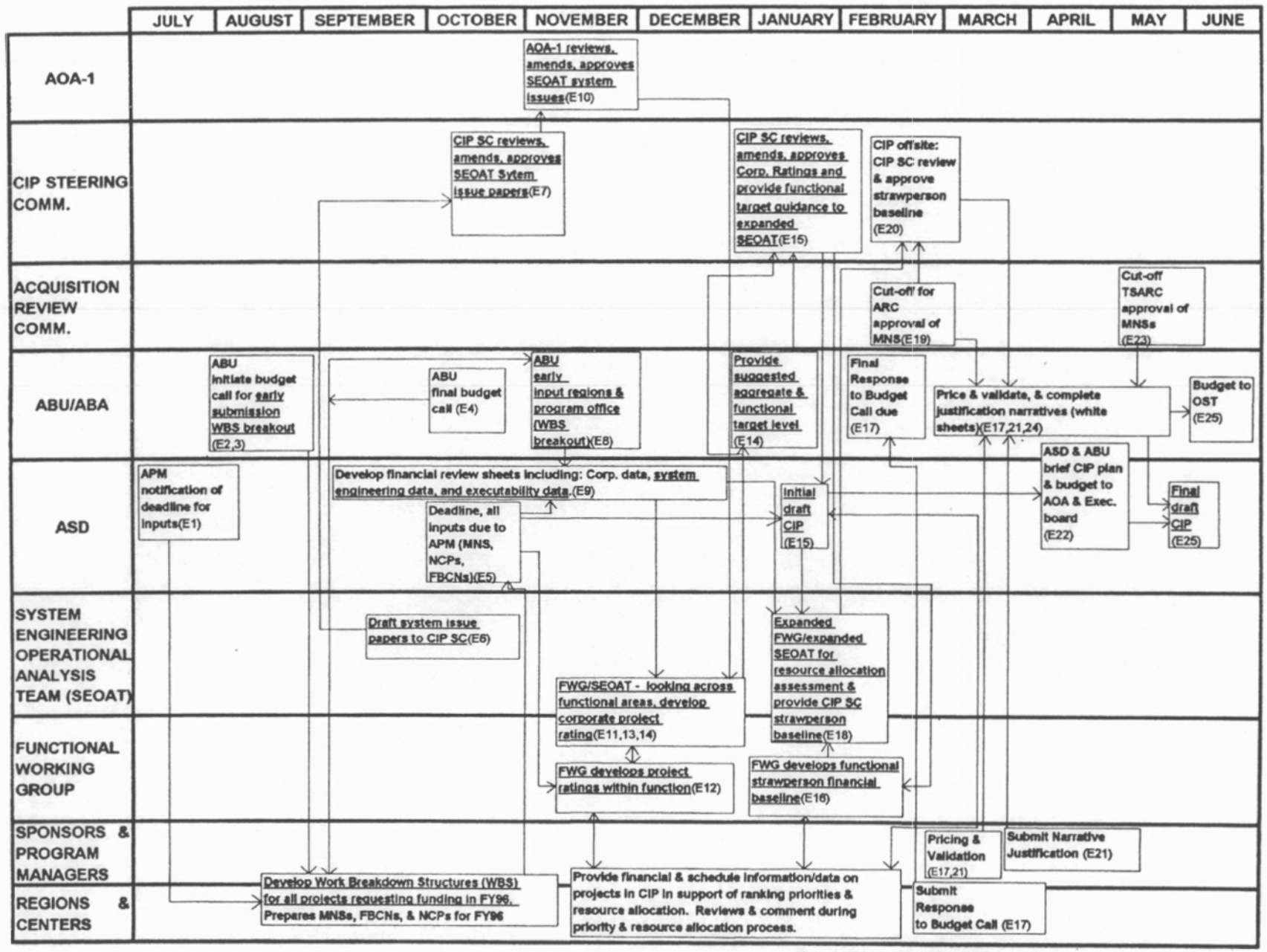
The Administrator will approve the Plan for publication after resolution of **OST/OMB** comments and any modification for conformance of the Plan with the current budget submission to Congress. The document will then be printed, distributed, and made available to the public.

A. Any changes resulting from OST actions on the budget will be incorporated in the schedules.

B. This document will be reviewed for completeness in layout, spelling, and editing. Approach and technical content cannot be changed; however, milestones that occur near the publishing date will be changed to reflect their actual status.

Point of Contact for Chapter 4 is Edwin Camacho, APM-300, 202-287-8723.

FAA CIP PLANNING PROCESS CYCLE FOR FY 1996



Note: (E#) Located in boxes indicates event number (see Appendix H)
Red & Underlined events are new to the process this year

FIGURE 4.1

PRIORITIZATION/RESOURCE ALLOCATION PROCESS

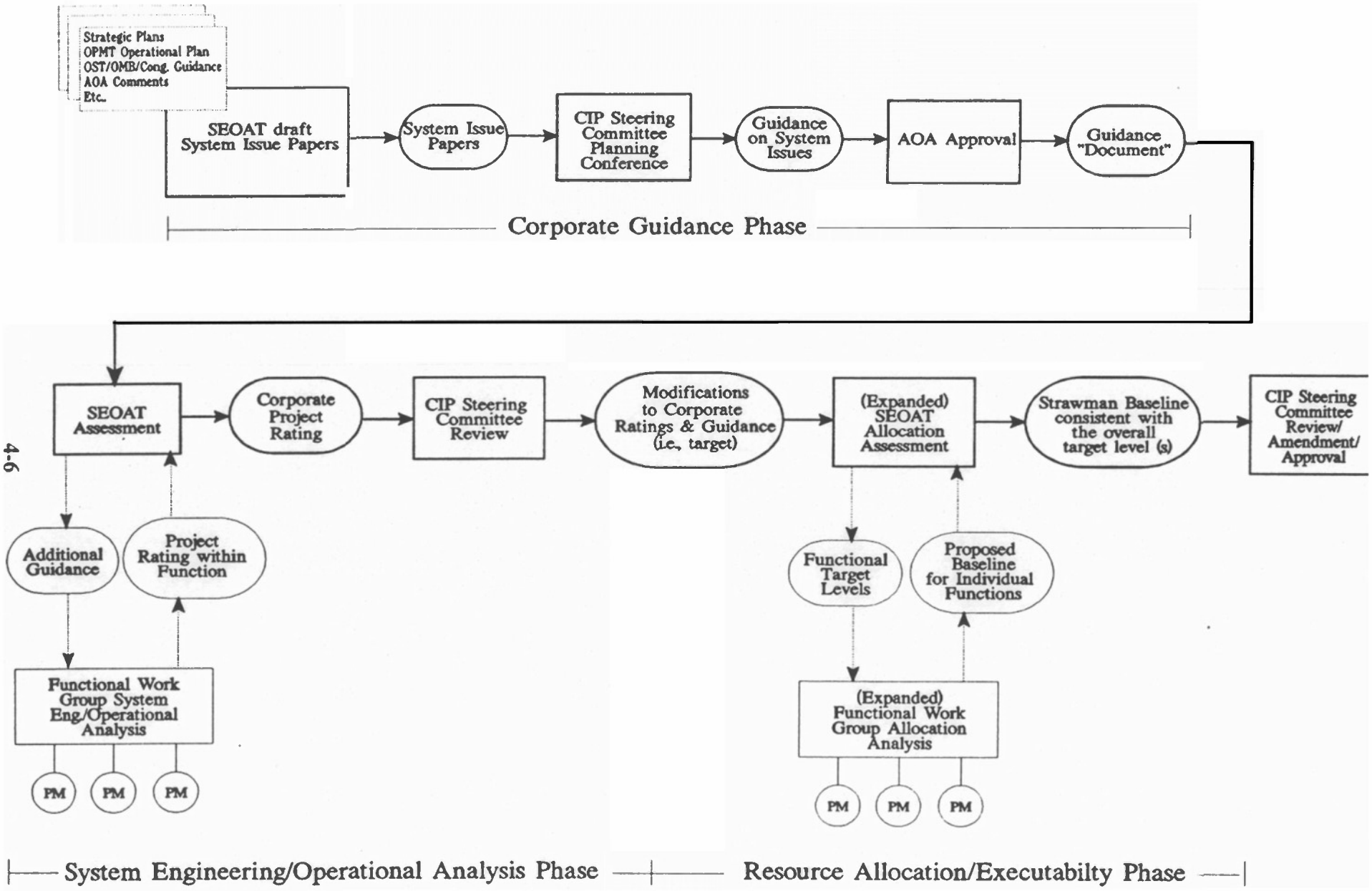


FIGURE 4.2

Chapter 5

FAA Budget Process

This chapter provides information on the FAA budget process.

Process Description

There are three phases in the budget process:

- Formulation
- Congressional Action
- Execution

Each of these is interrelated with the others. The time span from the beginning to completion of all three phases for a single budget year depends on which appropriation is being used, but for the longest, Facilities and Equipment **(F&E)**, the period is more than five calendar years.

Budget Formulation

Depending on the appropriation, the FAA budget cycle begins as early as 26 months before the start of the fiscal year to which the budget will pertain, with the issuance of "Call" documents by the Office of Budget **(ABU)**. For Facilities and Equipment **(F&E)**, a draft Call is developed in July and a working copy is forwarded to the regions in August, to begin preparation of project data. A separate document is issued by ABU for the following appropriations:

- Facilities and Equipment **(F&E)**
- Research, Engineering and Development **(R,E&D)**
- Operations **(OPS)**

These documents establish the basis for developing funding and staffing needs for one or more future budget years.

The regional budget offices assist the field or regional program divisions to "price out" their requirements, provide advice on the requirements and the associated justifications, and consolidate and summarize the division submissions (with staff and support submissions) into a single regional submission -- for

each activity in the Operations appropriation. The regional administrator transmits the consolidated submission without making any changes to regional program division requests and prepares and submits a critique of the budget and its balance (or lack thereof) to ABU. The Washington program offices and ABU review submissions of the various budget activities. Recommendations are presented to the Administrator who makes the final decision as to what is sent to the Office of the Secretary of Transportation (OST) in June.

OST conducts its review of the FAA request and makes certain program decisions, and changes to the level of dollars, positions or full-time equivalents (FTEs) requested by the FAA. Once OST has made its determinations, the FAA may appeal to the Secretary for restoration of all or part of the deleted programs or resources. After reconsideration and advice from OST on the appeal, the budget is submitted to the Office of Management and Budget (OMB) in September for further review and hearings.

In late November, OMB gives the FAA a "passback" consisting of dollars and positions/FTEs that OMB will recommend for inclusion in the President's budget request to Congress. Depending on the nature of the OMB "passback", the FAA may decide to appeal (with the concurrence of OST) to the OMB for restoration of all or part of the funds or positions/FTEs. Following a new decision or action by OMB, the FAA prepares its official budget to be included as part of the President's budget submission to Congress.

Congressional Action

The President's annual budget is usually transmitted to Congress on the first Monday in February (per OMB Bulletin 93-03 and the Budget Enforcement Act of 1990). This transmittal starts the congressional phase of the budget process. After submission of the President's Budget, the FAA prepares a submission consisting of more detailed data and justifications for the resources requested in the budget.

Before considering appropriations for a specific program, Congress must enact enabling legislation (i.e., authorizing an agency to carry out that program). Such legislation provides the legal basis for appropriating funds to the FAA and may also set limitations on the amount of money that can be appropriated. Programs may have permanent authorization or may be authorized to operate during a specific timeframe.

The Congressional appropriations process begins with appropriations hearings, usually in a House subcommittee. After those hearings, the subcommittee prepares a report with recommendations for appropriations to the FAA and other DOT agencies. The full Appropriations Committee then introduces a

bill to the full House. The House votes on the bill and forwards it to the Senate. The FAA and OST may appeal to the Senate if the House has reduced programs or resources requested by the President. Then a similar process is followed with the Senate Appropriations Subcommittee. If the dollar amounts between the two Congressional bodies differ, a joint conference convenes in order to resolve the discrepancy. When the conferees have reached agreement, both the full House and Senate vote. The end result of these deliberations is an appropriations bill which is enacted and forwarded to the President for signature. After signature by the President, it becomes a Public Law, which identifies specific levels of resources for the FAA for the fiscal year covered, as well as multiyear and no-year funding for certain programs. If an appropriations bill has not been passed by October 1, the Congress must pass a continuing resolution enabling the government to continue operations. A continuing resolution is typically much more constrained than proposed appropriations.

Budget Execution

During budget execution, funds in the approved fiscal year budget are made available to the FAA to carry out its missions, functions, and programs. Through apportionments issued by OMB, funds are made available for obligation on a time-phased basis. Upon OMB's approval of its apportionment request, ABU issues allotments based on the initial operating plans developed by the regions, centers, and Washington program offices.

Currently, ABU issues "allowances" to PMs in Washington and the regions. Allowances are similar to allotments in that they provide obligational authority to the individual receiving the allowance. As with allotments, allowances are adjusted based on the receipt of a revised operating plan that has been approved by the appropriate Washington program office.

Throughout the fiscal year, the amounts issued may be adjusted by ABU, based on revised operating plans and/or actions recommended by the Executive Resource Committee (ERC) and approved by the Executive Board. For example, when additional funds are required by a regional PM, a request is forwarded to the Washington program office for approval and is then forwarded to ABU for consideration by the ERC/Executive Board. If approved, ABU issues a revised allotment/allowance to support that increase through the appropriate regional budget office. The ERC is used initially to resolve operating policy issues and to make recommendations on these issues for Executive Directors' approval prior to issuance of funding adjustments.

Contacts

The following division can be contacted for additional information on budget policy:

- ABU-100, 202-267-3744

Reference Documents

The following documents are the basis for the guidelines presented:

- Business Manager's Financial Handbook, published October 1992 (to be updated in the May 1994 timeframe)
- Order 2500.22, Call for Estimates - R,E&D Appropriation
- Order 2500.55, Call for Estimates - Facilities and Equipment

Point of Contact for Chapter 5 is Paulette Lutjens, ABU-100, 202-267-3744.

MAJOR EVENTS IN THE FACILITIES & EQUIPMENT BUDGET PROCESS

(ONE BUDGET OVER 3 YEARS)

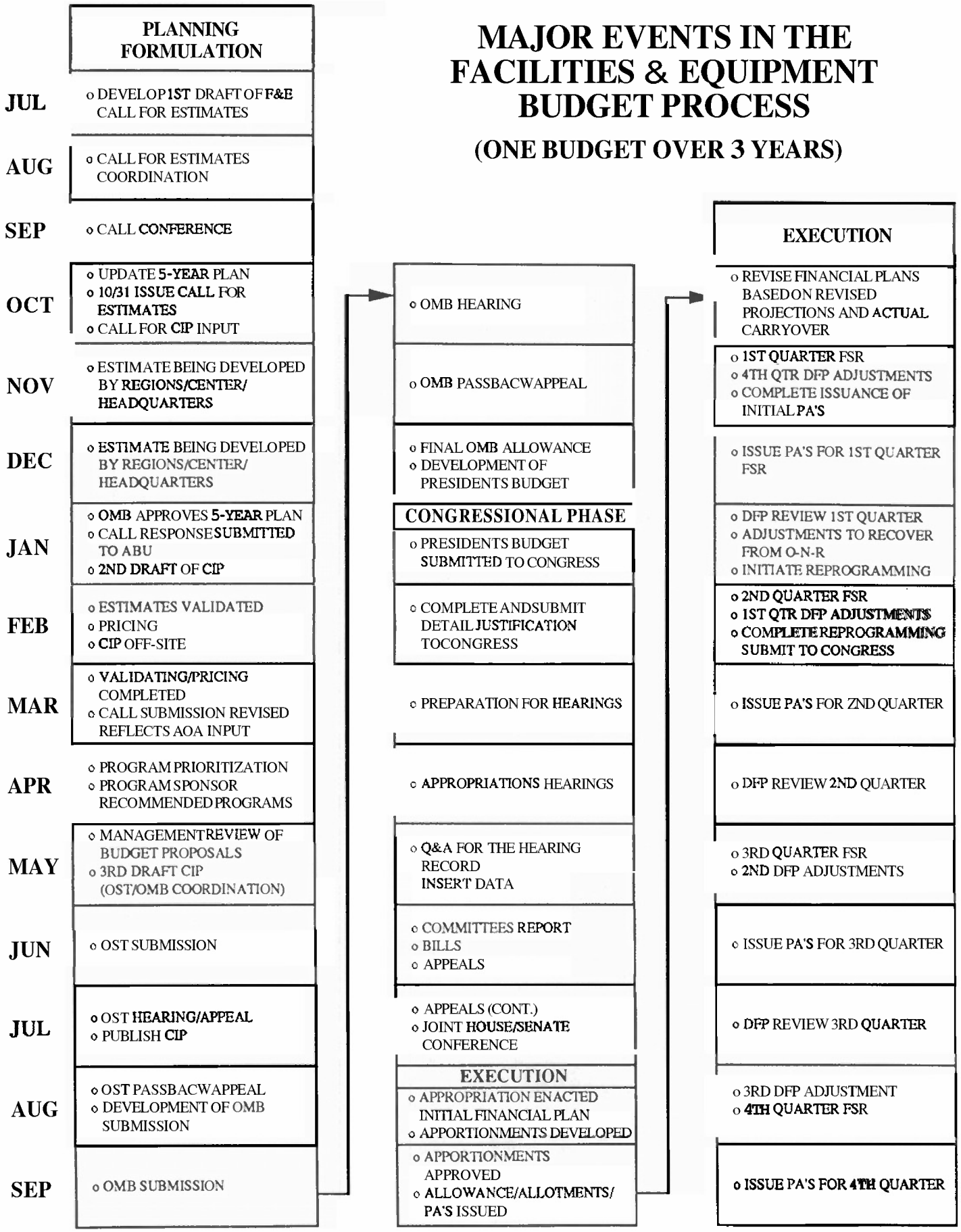


FIGURE 5.1

Chapter 6

NAS Test And Evaluation Policy

This chapter provides a reference to Order 1810.4B, National Airspace System (NAS) Test and Evaluation (T&E) Program and to the responsibilities and operation of the Test Policy Review Committee (TPRC).

Process Description

The flow chart presented in Figure 6.1 provides an overview of the test and evaluation process for NAS programs. A complete explanation of the process and the terms used in the process is presented in Order 1810.4B. Figure 6.2 is the test and evaluation implementation flow diagram. Independent Operational Test and Evaluation is discussed in Chapter 8.

The TPRC meets approximately bimonthly to consider T&E policy, TEMPs, T&E policy waivers, and any other business concerning T&E.

The secretariat that assists the TPRC chairperson in conducting the meetings is ASE-600. The TPRC meeting agenda is established by ASE-600.

Three weeks prior to the TPRC meeting date, ASE-600 receives the updated TEMPs and briefing packages from the PM. Two weeks in advance of a scheduled TPRC meeting, ASE-600 sends the meeting agenda and briefing packages to TPRC members.

The TPRC is chaired by ASD-2. The TPRC members are: ARD/ANA/ ANN/ANR/ANC/ANW/AAP/ANS-200#, ASM, ASU, AOS, ASE-1, ANS, ACN/ACD/ ATR, AFS, ATQ-1**, AND-6*, AND-3, AFE***.

#	Review limited to projects within purview of service organization
*	AND-6 Point of Contact for DOD Representative on Joint Procurements only
**	MAs and subsystems designated for Independent Operational Test and Evaluation (IOT&E) oversight only
***	For ANS-200 projects only

Lessons Learned

The PM must become familiar with the test policy. The PM should also be conversant with the latest revision to Order 1810.4.

Select a proficient APMT. The key to a successful T&E program is to have good support. Use the APMT for early strategy sessions to frame out the program's T&E for both DT&E and OTLE.

The PM should schedule the review of documentation requiring TPRC approval with ASE-600 well ahead of time so that there are no schedule conflicts.

Responsibilities

The following T&E responsibilities for PMs are extracted from Order 1810.4B:

- Develop project VRTM and incorporate into project specifications prior to SRB approval. If the project is beyond SRB, develop a project VRTM from the subsystem specification, per FAA-STD-024 (latest version), and Appendix 1 Part 6 of Order 1810.4B, and incorporate it into the project specification. Requirements in VRTM should also come from Operational Requirements Document (ORD).
- Supervise accomplishment of the project by the contractor
- Prepare a program directive with the FAA Technical Center to monitor or conduct DT&E, direct and conduct OT&E Integration and Operation, coordinate OT&E shakedown, and approve the budget for these testing activities
- Prepare a program directive with ASU to witness PAT&E (contractor conducts PAT&E)
- Include test and evaluation in the Program Master Plan
- Prepare the TEMP jointly, with the APMT taking the lead
- Coordinate T&E requirements with DOD on joint procurement
- Prepare test policy waiver requests, if necessary
- DT&E requirements are taken from the VRTM in the specification
- Monitor DT&E/PAT&E conducted by contractor

- Incorporate test requirements (DT&E and PAT&E) into the procurement package. NOTE: specification requirements taken from NAS-SS-1000, ORD are incorporated into procurement package. These requirements drive contractor testing - DT&E/PAT&E.

- Coordinate FAA TEMP approval with ASE-600 prior to TPRC distribution, and request for TPRC approval

- Present FAA TEMPs, waivers and test issues to the TPRC jointly with the APMT

The following responsibilities pertain to the TPRC:

- ASD-2 is responsible for chairing the TPRC meetings

- ASE-600 is responsible for TPRC secretariat functions. ASE-600 is also responsible for revising and maintaining FAA-STD-024 which describes content and format requirements for an FAA TEMP.

- TPRC members are responsible for attending meetings, reviewing agenda items and briefing packages, and providing input to the chairperson

The TPRC is responsible for:

- Supporting T&E policy, test standards and definitions

- Approving operating procedures, FAA TEMPs and revisions to FAA TEMPs

- Approving test policy waivers

- Resolving disagreements on T&E issues when agreements cannot be reached at lower levels of FAA management

Review and Approval

The following items related to T&E require review and approval to be in compliance with Order 1810.4B:

- FAA TEMP - Reviewed and approved by the TPRC; the TEMP is also reviewed by ATQ-1 for major acquisitions

- T&E policy waivers - Reviewed and approved by the TPRC; those for major acquisition projects are also reviewed by ATQ-1

- Changes to FAA TEMPs after TPRC approval - Reviewed and approved by the TPRC; TEMP changes for major acquisitions are also reviewed by ATQ-1

Contacts

The following groups are points of contact for more information regarding NAS test and evaluation and the TPRC:

- Engineering Specialties and Configuration Management Division, ASE-600, 202-287-8649

Reference Document

The following documents are the basis for the guidelines presented:

- Order **1810.1F,** Acquisition Policy
- Order **1810.4B,** FAA NAS Test and Evaluation Policy
- FAA-STD-024, Preparation of T&E Documentation
- NAS-MD-110, T&E Terms and Definitions for NAS (NOTE: we will probably delete this in 1994)
- Transportation Acquisition Manual Chapter 34, Appendix A, Major Acquisition Policies and Procedures

Point of Contact for Chapter 6 is Rebecca Taylor, ASE-600, 202-287-8649.

OVERVIEW OF FAA NAS TEST AND EVALUATION PROCESS

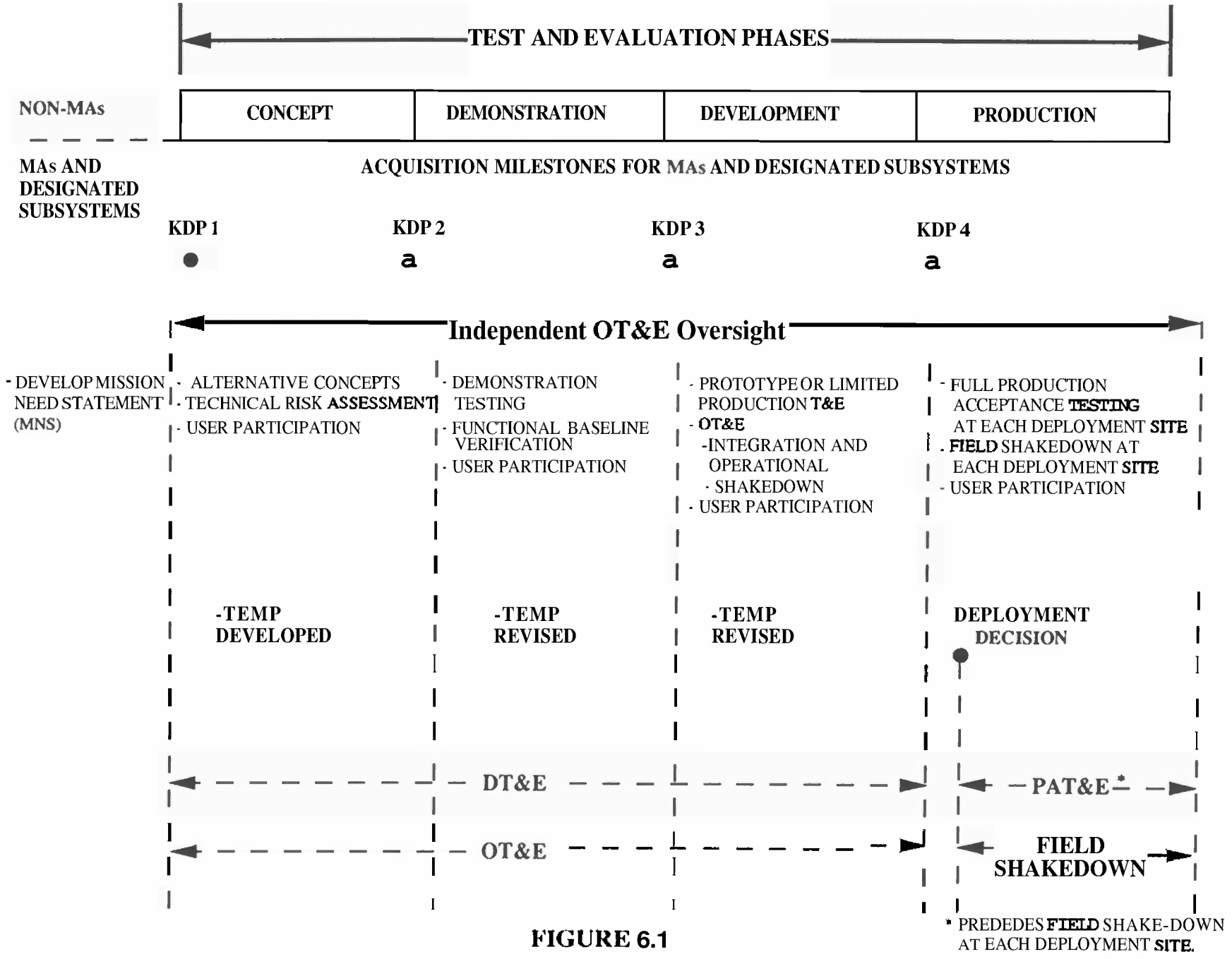


FIGURE 6.1

IMPLEMENTATION FLOW DIAGRAM FOR DEVELOPMENT PHASES

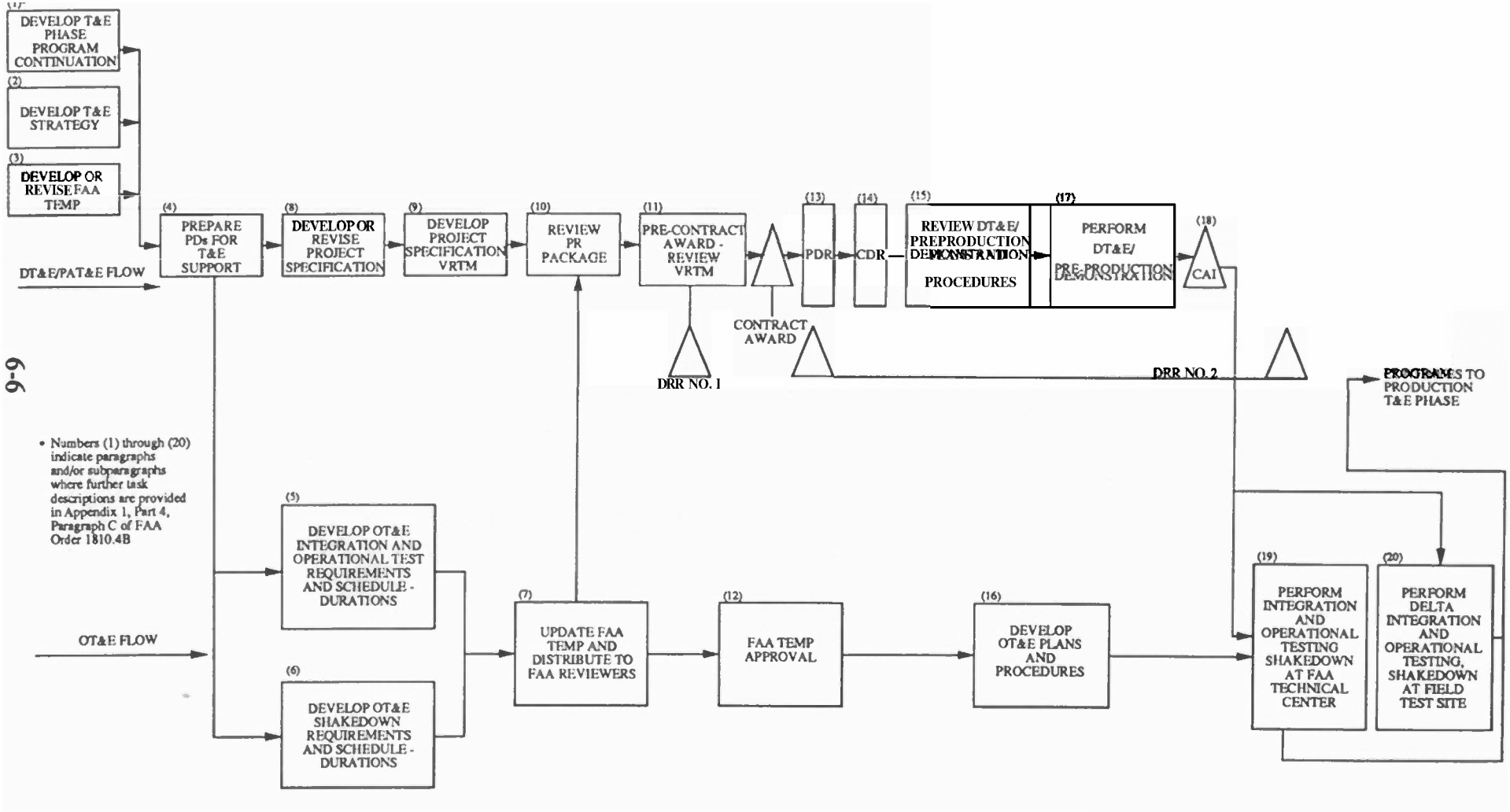


FIGURE 6.2

Chapter 7

Test And Evaluation Master Plan

Order 1810.1F, Acquisition Policy requires the development of Test and Evaluation Master Plans (TEMPs). The term TEMP replaces the term Master Test Plan (MTP) and contains the information required in FAA Order 1810.4B. This chapter provides a reference for the development and approval of TEMPs. FAA-STD-024 stipulates TEMP content and formats.

Process Description

A TEMP is required for all acquisition programs unless a waiver is granted by the Test Policy Review Committee (TPRC). The TEMP is the top-level test and evaluation (T&E) program document and serves as the key source document for development of lower-level test plans. TEMPs are developed early in the project life cycle, immediately after KDP-1 approval. The TEMP should be approved by the TPRC prior to the next KDP or major contract award(s). For each acquisition program, the FAA Technical Center will appoint an APMT who will work with the PM in conducting the T&E program. A program directive, drafted by the test director for joint signature with the program manager, is the vehicle which documents the agreement between the PM and the FAA Technical Center. Information regarding FAA Technical Center APMTs may be obtained from the Engineering, Test and Evaluation Service (ACN-12), the Engineering, Integration, and Operational Evaluation Service (ACW-1), or the Engineering Research and Development Service (ACD-1). The following are the PMs methods for developing and approving TEMPs, and for obtaining T&E policy waivers:

- Contacts ACD-1, ACN-1, or ACW-1 to arrange for an APMT as soon as possible after program initiation. The ACN organization assigns APMTs for NAS automation programs; the ACW organization assigns APMTs for communications, navigation, weather, and surveillance programs; and the ACD organization assigns APMTs for advanced concepts and technology programs.

- Establishes a program directive with the Office of Acquisition Support (ASU) for Production Acceptance Test and Evaluation (PAT&E) activities

Prepares the TEMP. The development of the TEMP should begin about 3 months after project initiation. The TEMP should be approved by the TPRC prior to the next KDP or major contract award(s). The format and content of the TEMP shall be in accordance with Order 1810.1F, FAA Order 1810.4B, FAA-STD-024 and use T&E terms and definitions as defined in NAS-MD-110. In case of conflict or inconsistency, Order 1810.1F and Order 1810.4B take precedence.

- Informally coordinates the TEMP with those who will be involved in the formal review process. This will facilitate the formal coordination cycle.

Prepares a clearance record for TEMP review that includes the following organizations: ARD/ANA/ANN/ANR/ANC/ANW/ AND-30/AAP/ANS-200/AOS#, ASM, ASU, ASE-1, ANS, ACN/ACD/ ACW, ATR, AFS, ATQ-1**, AND-6*, AND-3, AFE***, (Airway Facilities Division, Regional Air Traffic Division)****

Review limited to projects within purview of service organization

AND-6 Point of Contact for DOD Representative on Joint Procurements only

** MAs and subsystems designated for IOT&E Oversight only

*** For ANS-200 projects only

**** Review of FAA TEMP required by all potential "Field Test Site" locations' regional Airway Facilities Division and Regional Air Traffic Division

Sends information copies of TPRC approved TEMP to: Airway Facilities Division, Regional Air Traffic Division, AML-1, ACT, AMA-1, and ATH

- Includes a note on the clearance record, in the box labeled "REASON FOR ATTACHED," which reads, "RETURN ALL COMMENTS TO THE PROGRAM MANAGER FOR ACTION AND TO ASE-600 FOR INFORMATION". Also include a "DEADLINE DATE" allowing at least 3 weeks for review.

Submits the clearance record and a copy of the TEMP to ASE-600 for initialing prior to distribution. After the clearance record is initialed, it is to be signed out by the director of the project office.

Submits clearance record and copy of TEMP to ASE-600 for review and initialing prior to distribution

Obtains signature of Program Director or Division Manager on clearance record

Reproduces enough copies of the clearance record and TEMP to distribute to all TEMP review organizations, and as information copies

Distributes the clearance record and TEMP for review

Works off all nonconcurs and addresses all comments from concur with comment responses

Updates the document incorporating all comments and responses as appropriate, and provides a copy of the updated TEMP to the APMT

Arranges for the TEMP to be placed on the TPRC agenda by contacting ASE-600

Prepares a disposition of all comments. This disposition includes information on the commenting organization, the comment, how it has been accommodated, or why it has not been accommodated.

Prepares a presentation for the TPRC that provides the following information for T&E documents:

Overview of the TEMP that addresses the following topics:

a. MNS of the program

b. Current NAS system capability (as applicable)

c. Planned program capabilities

d. NAS iteroperable subsystems configuration diagram

e. General Test Overview
   - Summarize T&E (DT&E/OT&E) results to date
   - Describe T&E (DT&E/OT&E) for the present program T&E phase
   - List responsible test organizations for current T&E phase
   - Describe operational software development relative to the subsystem operating in the NAS
   - Identify those programs not available for integration testing because of acquisition considerations
   - Describe the program methodology for implementation of deferred requirements
   - Identify transitional interfaces required to allow interfacing to the existing NAS

- Identify T&E issues/concerns

f. Test Schedule Overview
   - T&E schedule durations
   - Major program milestones
   - Future T&E phase revision to the TEMP

g. TEMP Issues
   - Provide a list of reviewers and summary of all comments received with emphasis on comments not incorporated into the TEMP with supporting rationale
   - TEMP recommendation for approval by the TPRC

Overview of policy waiver request that addresses:

a. Specific identification of waiver or deviation from the T&E policy requested

b. Rationale to support waiver/deviation request

c. Disposition summary of all comments received

d. Impact if waiver/deviation request is not approved

Changes to TPRC-Approved TEMP in briefing that address:

a. Description of the change(s)

b. Statement as to why the changes are necessary

c. Disposition summary of all comments received

d. Indication that all comments received have been resolved, or an explanation as to why the comment(s) cannot be accommodated

- Provides the TPRC secretariat with 30 copies of the updated TEMP and TPRC briefing package at least 3 weeks prior to the scheduled TPRC meeting date; ASE-600 will distribute with the meeting agenda to the TPRC members 2 weeks prior to the meeting date

Lessons Learned

FAA TEMPs must be developed early in the project life cycle to ensure that adequate budget and schedule time is programmed to conduct a comprehensive T&E program. Late attention to the T&E program has generally resulted in program overruns, as well as compressed and unrealistic testing schedules with subsequent delays in project deployment.

Responsibilities

The PM is responsible for ensuring that the intent of Order 1810.4B, NAS Test and Evaluation Program, is met.

ASE-600 is responsible for revising and maintaining FAA-STD-024 which describes content and format requirements for an FAA TEMP.

ASE-600 also serves as TPRC secretariat. The following are the secretariat's responsibilities:

- Assists the TPRC chairperson with the conduct of the TPRC meetings
- Presents TPRC minutes to the committee for approval
- Tracks TPRC action items
- Establishes the TPRC agenda
- Maintains TPRC records and minutes
- Coordinates the preparation, distribution, and review of all TPRC documentation

Review and Approval

TEMPs are reviewed by the TPRC member organizations and approved by the TPRC. The PM is responsible for forwarding approved copies of the TEMP to interested organizations concurrent with distribution to the TPRC.

Contacts

The following groups can be contacted for additional information on **TEMPs:**

- Engineering Specialties and Configuration Management Division, ASE-600, 202-287-8649
- ACW-1, 609-484-5016
- ACN-1, 609-484-6011
- ACD-1, 609-484-6085

Reference Documents

The following documents are the basis for the guidelines presented:

- Order 1810.1F, Acquisition Policy
- Order 1810.4B, NAS Test and Evaluation Program
- FAA-STD-024, Preparation of T&E Documentation
- NAS-MD-110, T&E Terms and Definitions for NAS

Point of Contact for Chapter 7 is Rebecca Taylor, ASE-600, 202-287-8649.

TEST AND EVALUATION MASTER PLAN DEVELOPMENT FLOW

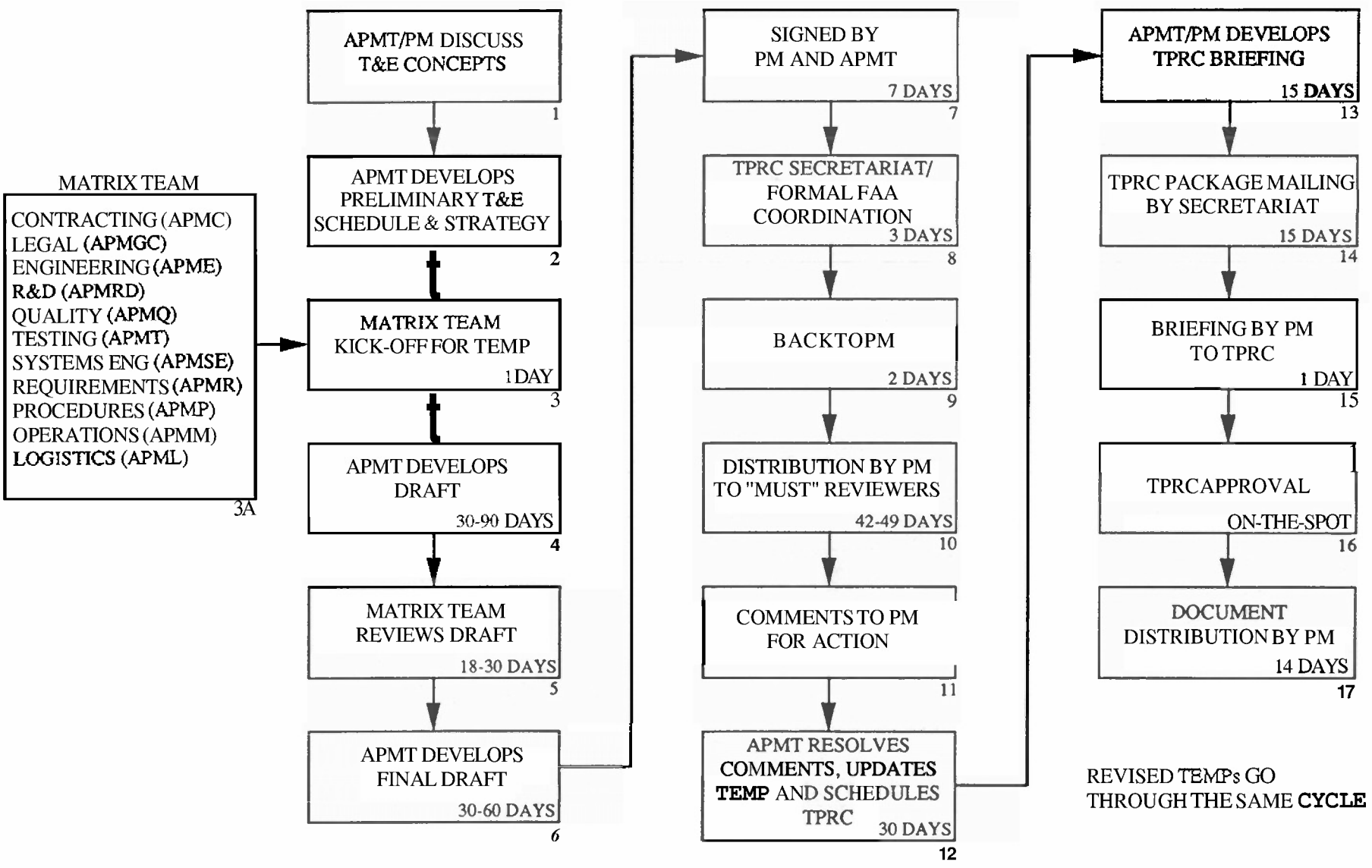


FIGURE 7.1

Chapter 8

Independent Operational Test And Evaluation Oversight

This chapter provides a reference for meeting the requirements of Order 1810.2, Independent Operational Test and Evaluation for Major Systems Acquisition, and subsystems designated for oversight.

Order 1810.2 will soon be revised to reflect several recent acquisition and oversight policy changes set forth by the Administrator. In the meantime, both Order 1810.1F, FAA Acquisition Policy, and Order 1810.4B, NAS Test and Evaluation Program, further define and identify the role of IOT&E Oversight in the acquisition process. Currently, the IOT&E Oversight function is applied primarily to Level I Major Acquisition Programs, such as AAS, VSCS, CWP, TDWR, ARSR-4, Mode-S, and MLS. However, recent FAA policy changes and planned increases in IOT&E support, will permit the FAA to conduct more formal and indepth independent assessments of the operational effectiveness and suitability of a substantially greater number of Level I, Level II, and Level III major acquisition programs.

Mission

The Office of Independent Operational Test and Evaluation Oversight is responsible for the objective, independent assessment of operational effectiveness and suitability for all acquisition programs designated by DOT or FAA Acquisition Executive for Independent Operational Test and Evaluation (IOT&E) Oversight. The Director, ATQ-1, shall report IOT&E findings to the Administrator and the ARC prior to each key decision point in the acquisition program, and prior to system commissioning (ORD) at the discretion of the Administrator. The TEMP and each update are co-approved and signed by both the Director of the Office of IOT&E Oversight, and the TPRC Chairperson for all acquisition programs designated for IOT&E oversight. The IOT&E standard for assessing the operational readiness of major acquisitions to meet FAA mission needs, and to be deployed in the NAS comprises the following two components:

- **Operational Effectiveness:** The degree of overall mission accomplishment of a system used by representative operational personnel. This is accomplished within the context of the organization, mission, and environment

anticipated for the planned operational employment of the system.

- **Operational Suitability:** The ability of a system to be satisfactorily integrated and employed for field use. Considerations are given to operability by field personnel, system compatibility, reliability, human performance, maintenance and logistic support, safety, and training requirements

Lessons Learned

Operational testing schedules must not be compressed. Time should be allotted in the testing schedule to allow for fixes and retesting. The danger is that while development problems may be solved, operational issues may not. The end result could be an acquisition product that meets all specification requirements, but cannot be used satisfactorily by operational personnel.

Responsibilities

The following are the responsibilities of the IOT&E Oversight Office which operates independently of any PM or Program Sponsor:

- Initiate and conduct an objective, independent assessment of operational effectiveness and suitability for all acquisition programs designated by the DOT or FAA Acquisition Executive for IOT&E Oversight

- Prepare independent assessment oversight reports for the Administrator, the Acquisition Executive, and ARC

- Report results and make recommendations to the Acquisition Review Committee at all KDPs, with regards to operational effectiveness and suitability for all acquisition programs designated for IOT&E oversight

- To ensure that they are represented on the Acquisition Review Committee by the Director

- Review and co-approve, with the TPRC Chairperson, all TEMPs, and each update for those acquisition programs designated for IOT&E oversight

- To obtain representation on the TPRC through the Director

- Provide appropriate comments and recommendations to the PM of these acquisition programs designated for IOT&E oversight, prior to each KDP

- Review, test, and evaluation requirements, plans, procedures, and resources to ensure that test and evaluation objectives are adequately addressed in support of assessment of the acquisition system's operational effectiveness and suitability

- Monitor the conduct of both contractor and FAA testing, and review the test results to ascertain system effectiveness and suitability. May, at the discretion of the Director of IOTLE, conduct independent testing and analysis of test data.

- Determine the Critical Operational Issues (COI) and the Key Measures of Operational Readiness (KMOR) required to support the objective and independent assessment of the operational effectiveness and suitability of those acquisition programs designated for IOTLE Oversight

- Represent the FAA on matters pertaining to IOT&E functions when responding to requests from Congress, the Government Accounting Office (GAO), Department of Transportation (DOT), Office of Management and Budget (OMB), other Government agencies (e.g., National Aeronautics and Space Administration (NASA) or the Department of Defense (DOD)), industry and aviation or national airspace user organizations

Program Manager's Responsibilities

- Support the OT&E function

- Approves testing reports prepared jointly by the APMT and the Test Director (see Chapter 7), who also establish the "realistic" test environment, conduct all testing activities

- Coordinate the TEMP with the IOT&E office and the program sponsor, and secure concurrence from both through the TPRC

- Provide testing reports to the IOT&E office and the program sponsor

- Monitor the acquisition program to determine that the sponsor's requirements are being met

- Prepare evaluation criteria to assess the operational acceptability of a major system. These criteria must be determined early in the acquisition cycle and made available to the PM and the IOTLE office.

- Monitor operational testing and comment on the APMT'S test report, or the IOT&E assessment report

- Provide operational testing personnel with necessary skills and training to support the establishment of a "realistic" test environment

- Coordinate with PMs, regions, the Office of Training and Higher Education, and the FAA Academy to obtain trained personnel prior to beginning operational testing

- Coordinate with the regions to develop training requirements for effective use of the acquisition product

Contacts

The following staff may be contacted for additional information on IOT&E:

- IOT&E Office, ATQ-1, FTS 267-8926

Reference Documents

The following documents are the basis for the guidelines presented:

- OMB Circular A-109, Major Systems Acquisition

- DOT Transportation Acquisition Manual Chapter 34, Appendix A, Major Acquisition Policies and Procedures

- Order 1810.1F, FAA Acquisition Policy

- Order 1810.2, Independent Operational Test and Evaluation for Major Systems Acquisition

- Order 1810.4B, NAS Test and Evaluation Program

- NAS-MD-110, T&E Terms and Definitions for NAS

Point of Contact for Chapter 8 is Charles Overbey, ATQ-1, FTS 482-6171.

Chapter 9

Human Factors Engineering

This chapter describes processes and procedures to ensure that the people who operate and maintain the NAS are fully considered in all phases of system development. Failure to adequately include the performance of the **operator/maintainer** components of systems increases the risk of system malfunction or failure. On the other hand, by understanding, measuring, designing, and documenting for the end user; system performance can be enhanced for mission accomplishment, safety, and supportability. Both the Capital Investment Plan (CIP) and the Research, Engineering and Development (R,E&D) Plan emphasize the need for ensuring that automation and the application of technology to aviation take full account of the human element in the system.

Definitions

Human Factors (HF) - A multi-disciplinary effort to generate and compile information about human capabilities and limitations; and apply that information to equipment, systems, facilities, procedures, jobs, environments, training, staffing, and personnel management for safe, comfortable, effective human performance

Human Factors Engineer - An individual with specialized expertise in human performance as well as in systems engineering and the acquisition process

Human Factors Engineering (HFE) - The application of human factors considerations concurrent with other engineering disciplines during the design, development, and fielding of a system in which human performance is essential in meeting system safety and performance objectives

HFE Process Description

Practicing human factors engineers deal with a wide variety of design issues involving the functional integration of humans in complex systems. Practical solutions to these issues generally require identification of human performance information; translating the information into a form germane to the issue; and effectively communicating design trade offs.

More specifically, the human factors engineer supports the program manager in meeting the **customer/user** operational performance requirements within program cost and schedule

objectives. The application of human factors engineering originates early in the acquisition decision-making process (starting with the Mission Analysis and continuing throughout the program) to ensure that decisions and alternatives regarding program requirements, solicitation preparation, source selection, research, design, development, test, and evaluation are in consonance with the operational and maintenance concept, suitable to the intended operating environment, compatible with the user, and meet the sponsor's operational needs.

Human Factors Plan Description

To ensure human factors considerations are fully incorporated in the system development, the Program Manager initiates a Human Factors Plan (HFP) that addresses the human performance and human resource parameters for program and design alternatives. The HFP is first developed during Phase 1 and updated during each subsequent acquisition phase. The initial HFP outlines the background, issues, tasks, and strategy associated with human considerations in the operation, maintenance, and support of system options. Subsequent updates to the HFP further define and refine the human factors program and issues in the program. The HFP is a living document, tailored to the specific program requirements, procurement strategy, key decision point, and acquisition phase as well as customer considerations of the program. It imposes only the necessary and reasonable requirements to achieve 1) the objective effectiveness of human performance during system operation, maintenance, and support, and 2) the efficient use of personnel resources, skills, training, and funds. The intent of the HFP is to specify how the Government will direct and control the identification and resolution of human performance issues, so as to integrate human performance considerations throughout the program. The content of a Human Factors Plan includes:

1. Background:

   a. Program Summary. Provides a brief description of the program (including relevant concepts for operation and maintenance).

   b. Program Schedule. Provides an overview of the program schedule.

   c. Target Audience. Identifies the population that will be affected during the operations and maintenance of the system. Includes a description of any relevant demographics, biographical information, training background, aptitudes, anthropometric data, physical qualifications, organizational relationships, and workspace requirements. (Lengthy descriptions may be included in an appendix).

d. Guidance. Summarizes any decisions, previous guidance, and assumptions that will impact the human factors approach or results.

e. Constraints. Identifies the known or anticipated program limitations for the system (e.g., technical, manpower, training time available, resources) that will impact upon the achievement of human performance, personnel resources, training, and human factors engineering goals and requirements.

2. Issues and Enhancements: Lists and describes the problems, concerns, deficiencies, risks, and opportunities to be addressed by human factors efforts during the system development. (As this list and description of issues become more lengthy, the details may be included in an appendix).

a. Issue Description. Describes the issue or problem background, importance, and consequence.

b. Objectives. Identifies the objectives to be met, obstacles to be overcome, and the planned solution. Also, provides quantifiable performance measures and criteria that will be used to evaluate resolution of the issue.

c. Actions. Identifies the actions to be taken in remediation of the issue and current status.

3. Activities: Provides a list and description of each activity (e.g., tasks, studies, analyses) to be performed during the acquisition in support of resolving the issues and controlling the human factors program.

a. Activity Description. For each phase, describes the activities to be performed; the rationale (i.e., reasons for the activity to be conducted); the technical information needed, data requirements and sources; the estimated resources (e.g., time, personnel, funding) required to complete the activity; and the organization expected to perform the activity.

b. Activity Schedule: Displays the activities to be undertaken and their relationship to each other and to other significant program activities, events, and decision points.

4. Strategy:

   a. Goals and Requirements. Identifies the major human factors performance objectives necessary to achieve compatibility and suitability with the operational and maintenance concepts.

   b. Approach. Describes the general approach to be taken in order to achieve the human factors goals and requirements, meet customer operational needs, and resolve major issues.

   c. References. Identifies relevant references needed for the full understanding of the HFP.

Review, Approval, and Distribution

The Program Manager coordinates with (and provides copies to) the matrix team, program sponsor, and other appropriate organizations.

Responsibilities

- The PM assesses and reports HFE progress at program reviews and Key Decision Points, and administers the appropriate HFE resources to assure maximum operational effectiveness is met
- The program sponsor assists in assuring program HFE progress consistent with user needs within the intended operational environment
- Development program directors and service directors (as applicable) ensure HFE considerations are appropriately addressed at program reviews and Key Decision Points
- AXD-4 provides a focal point for human factors information and support
- ASE provides technical support for hardware and software interface issues

Lessons Learned

HFE Complexity: Human factors engineering encompasses more than providing evaluations or design guidance with respect to simple controls/knobs/dials. HFE support in system design and development also includes developing and applying information about the total human performance envelope (e.g. physical and cognitive workload; vigilance tasks; physiological, anthropometric, and demographic concerns) in hardware, software, and procedures design.

Early Participation: HFE personnel must be a part of the program team from the very beginning. This early involvement will identify and resolve performance deficiencies up front and help reduce program cost and schedule risks.

Avoid Program Pitfalls: Experience has shown that ignoring HF issues can result in schedule and cost penalties. Operational systems flawed by the lack of human factors will cost additional resources as a result of hardware modifications, overly complex procedures and regulation, or additional training to counter (while not necessarily correcting) the flaws. Flawed systems may cause unacceptable technical or safety risks including potentially fatal errors.

Continuity of Effort: The successful application of human factors to an acquisition program depends upon the degree to which there is consistent and coordinated incorporation of human performance considerations at (and between) each step of the system development. This approach requires that human factors (i.e., constraints, objectives, requirements, strategies, activities, standards, and specifications) be continuously addressed and updated during requirements determination, solicitation preparation, source selection, design and program reviews, and test and evaluation.

Contacts

Additional information concerning human factor engineering can be obtained from:

- AXD-4, 202-267-7125

Reference Documentation

The following documents provide additional information about applying human factors:

- FAA Order 9550.8, Human Factors Policy
- FAA Order 1810.1F, Acquisition Policy (para 4-9)
- MIL-H-46855, Human Engineering Requirements for Military Systems, Equipment, and Facilities
- MIL-STD-1472, Human Engineering Design Criteria for Military Systems, Equipment, and Facilities

Point of Contact for Chapter 9 is Glen Hewitt, AXD-4, 202-267-7125.

Chapter 10

The NAILS Program

This chapter provides a clear and concise description of the National Airspace Integrated Logistics Support (NAILS) Program as delineated in Order **1800.58A,** National Airspace Integrated Logistics Support (NAILS) Policy, and outlines procedures for program accomplishment.

NAILS Process Description

Acquisition of a subsystem or equipment entails not only the acquisition of hardware and software, but also acquisition of the logistics resources required to support the equipment.

Supportability must be accorded the same level of importance in making program management decisions as cost, schedule, and performance of the equipment.

The fundamental objective of a NAILS program is to ensure that adequate logistics resources are available for the appropriate maintenance and operations of an equipment when needed. The FAA NAILS Policy Order ensures the infrastructure is in place by designating NAILS matrix organizations and their associated responsibilities.

Definitions

National Airspace Integrated Logistics Support (NAILS) - **A** disciplined approach to plan and integrate support considerations into design; acquire the necessary initial support for the equipment; and identify life cycle support requirements.

National Airspace Integrated Logistics Support Management Team (NAILSMT) - A management team formed to plan, coordinate, and integrate the efforts of all concerned with equipment support to ensure that logistics support requirements are identified and satisfied prior to deployment of the equipment.

Associate Program Manager for Logistics (APML) - An integrated logistics support specialist responsible for ensuring that all NAILS requirements are identified and satisfied for each piece of equipment in the acquisition process; R,E&D program; and major equipment modification program.

Integrated Logistics Support Plan (ILSP) - A document that describes the integrated logistics support program requirements, tasks, and milestones in the equipment acquisition process; R,E&D program or major equipment modification program. The ILSP is developed under direction of the APML with input from the NAILSMT. The ILSP is an iterative document and is updated as the program progresses.

Matrix Organization

NAILS programs shall be organized in a matrix fashion. Multiple organizations shall focus their efforts to support the Program Manager (PM) for individual acquisitions. NAILS matrix organizations include: Mike Monroney Aeronautical Center (AAC), FAA Technical Center (ACT), Office of Training and Higher Education (AHT), Office of Acquisition Support (ASU), System Maintenance Service (ASM), NAS Transition and Implementation Service (ANS), Air Traffic Requirements Service (ATR), Office of Air Traffic Program Management (ATZ), and lead or designated regional Airway Facilities Division.

Coordination

The NAS Transition and Implementation Service (ANS), under the Associate Administrator for Airway Facilities (AAF-1), is responsible for ensuring that NAILS requirements are identified and integrated into the acquisition process to facilitate total life cycle support. The NAILS Program Division, ANS-400, is the focal point for NAILS and coordinates interaction among the matrix organizations. An APML is designated by ANS-400 and chairs the NAILSMT. The APML coordinates NAILS matrix organizational efforts in order to obtain a tailored support program for each project. Each of the matrix organizations is represented by an element manager (EM) at the NAILSMT. NAILS EMs shall respond directly to the requirements of the APML.

NAILSMT membership shall include the APML, program office, and additional personnel as required, NAILS EMs, representatives of lead or designated FAA regional Airway Facilities Division, representatives of the FAA Technical Center, as required, and equipment contractor representatives, when required.

NAILS Elements

NAILS elements are the principal logistics requirements that must be properly integrated to achieve economical and effective support of an equipment throughout its life cycle. The EMs from the matrix organizations represent these eight NAILS elements as explained below:

- Direct-Work Maintenance Staffing - Direct person-hours required to maintain an equipment over its life cycle

- Maintenance Planning - The process of determining and establishing maintenance requirements for the life of a supported equipment. This includes support for hardware and software.

- Maintenance Support Facilities - Maintenance support work areas, storage areas or other facilities required to perform maintenance tasks

- Packaging, Handling, Storage, and Transportation - Resources and methods used to ensure that equipment and support items are preserved, packaged, handled, stored, and transported safely

- Supply Support - Actions taken to acquire, catalog, receive, store, and issue items of supply

- Support Equipment - Special tools and equipment required to support the operation and maintenance of an equipment. This includes standard test equipment.

- Technical Data - Recorded information such as manuals, specifications, drawings, and operational test procedures required to operate and maintain an equipment over its life cycle

- Training, Training Support, and Personnel Skills - Identification of skills, processes, procedures, course material, and equipment used to train personnel to operate and maintain an equipment

Procedures for NAILS Program Accomplishment

Scheduling of tasks shall be compatible with the acquisition process milestones and follow on logistics support requirements. These tasks shall be executed by the NAILS matrix organizations to implement the NAILS program as follows:

- At program inception, the PM notifies ANS-400 of the proposed equipment acquisition and requests that an APML be assigned

- ANS-400 assigns an APML within 30 days of request. ANS-400 then notifies the PM and NAILS matrix organizations of the APML assignment.

- The APML assists the PM in the development of budget estimates for the acquisition and support costs related to NAILS requirements

- The APML develops an initial ILSP based on the maintenance, training, and other logistics support requirements identified by the NAILS **EMs**. As the program progresses, the APML updates the ILSP to reflect any changes. The PM reviews and approves the ILSP.

Throughout the acquisition process, the APML acts as the liaison between the PM and the NAILSMT. First, the APML ensures that all NAILS element requirements are included in the procurement package. Second, the APML monitors the procurement package and coordinates with the PM and contracting offices to define and resolve issues related to NAILS requirements. Third, contract data requirements list reviews and other items of NAILS interest (such as NAS Change Proposals and Engineering Change Proposals) are evaluated for completeness, accuracy, and timeliness.

Contacts

The following offices can be contacted for additional information on NAILS requirements:

- NAILS Program Division, **ANS-400**, 202-267-7795
- NAILS Policy and Planning Branch, ANS-410, 202-267-7926
- NAILS Implementation Branch, ANS-420, 202-267-7796

Lessons Learned

Early identification of logistics support requirements and associated support costs can considerably reduce problems during system life cycle, and total support at the least life cycle cost.

The PM should have a clear idea of the basic function of the system being supported, and of the support policy, before preparing a detailed estimate of logistics costs.

Detailed documentation of NAILS requirements in the ILSP saves considerable rewriting of the procurement package.

The NAILS **EMs** should tailor logistics support analysis requirements carefully to avoid procurement of data and deliverables that the program will never use or even be able to review.

Reference Documents

These documents provided the basis for the guidelines presented:

- **MIL-STD-1388-1A,** Logistics Support Analysis
- **MIL-STD-1388-2A/2B,** DOD Requirements for Logistics Support Analysis Record
- **MIL-STD-1561B,** Provisioning Procedures
- **FAA-G-1210d,** Provisioning Technical Documentation
- **FAA-G-1375c,** Spare Parts—Peculiar for Electronic, Electrical, and Mechanical Equipment
- Order **1800.58A** (Draft), National Airspace Integrated Logistics Support (NAILS) Policy
- Order 1810.6, Policy For the Use of Nondevelopmental Items **(NDI)** in FAA Acquisitions
- Order **4560.1B,** Policies and Procedures Covering the Provisioning Process During the Acquisition of FAA Materiel
- Order **6000.30B,** Policy for Maintenance of the National Airspace System **(NAS)** Through the Year **2000**
- Order 6000.38, Policy to Determine NAS Equipment Sparing Requirements for Airway Facilities Work Center
- FAA—STD—035, Commercial Equipment, Market Research for

Point of Contact for Chapter 10 is Thomas Pope, ANS—410, 202—267—7985.

Chapter 11

Procurement Readiness Review

This chapter describes the operation of the Procurement Readiness Review **(PRR).**

PRR Process Description

The PRR process is designed to assist the PM and other management personnel in preparing the PR package. The PR package includes the specifications, SOW, CDRL and other materials provided to the CO with the PR form. Use of the PRR Checklist in planning and preparing the PR package will improve the quality and consistency of the **PRs** submitted to the Contracting Office and improve overall procurement efficiency. The following are included in the **PRR** Checklist:

- Program and acquisition documentation
- Budget/cost
- Schedules
- Systems engineering
- Project Specifications
- Test and evaluation
- Maintenance
- Logistics
- Risk
- Deliverables
- Solicitation provisions
- Safety and security
- Technical reviews and audits
- Contractor performance
- Contract payments

Responsibilities

Responsibilities for the **PRR** are described in FAA Notice 1810.2, Procurement Readiness Review **(PRR)** Process. Primary responsibility for the PRR lies with **PMs** and program directors/ service directors.

The Program Manager is responsible for the following:

- Review the PRR checklist with the program team early in the procurement planning cycle to identify and address all required items
- Periodically review the tailored PRR checklist for the program with responsible team members
- Prepare briefings as required for the Program Director and AND management

The program director/service director is responsible for the following:

- Monitor the conduct of the program and provide assistance as requested by the **PMs**
- Conduct PRR prior to the transmission of the PR package to ASU, allowing sufficient time for revisions
- Ensure that PRR policy is carried out, make local modifications, and suggest amendments to policy when required

Contacts

The following staff can be contacted for additional information on the PRR:

- AND-4, 202-267-9080

Reference Document

The following document is the basis for the guidelines presented:

- FAA Notice 1810.2, Procurement Readiness Review **(PRR)** Process (PRR checklists are included in this Notice)

Point of Contact for Chapter 11 is Kenneth Ward, AND-4, 202-267-9080.

Chapter 12

Interface Management

This chapter describes the management process for Interface Requirements Documents (IRDs), Interface Revisions (IRs), and Interface Control Documents (ICDs).

Process Description

Systems Engineering develops system level interface requirements for a large number of organizations engaged in design and acquisition of NAS subsystems to ensure compatibility of all NAS subsystem interfaces. The systems engineering process will document interface requirements through the interface management process which involves the Interface Control Working Groups (ICWGs). IRDs, IRs, and ICDs are the three basic documents for ensuring interface compatibility and control.

The NAS Interface Management Plan, DOT/FAA/ES-85/01, fully describes the management process for functional and physical interfaces, and provides general rules to guide the development of IRDs, IRs, and ICDs. It also defines the roles and responsibilities of the ICWGs.

Interface Requirements Documents

IRDs contain the functional, performance, and verification requirements for NAS subsystem interfaces. Format and content of the IRDs are developed in accordance with FAA-STD-025. The IRD formalizes, documents, controls, and imposes interface design requirements in accordance with applicable NAS interface standards and NAS-baselined specifications such as the NAS Level I Design Document (NAS-DD-1000) and the NAS System Specification (NAS-SS-1000).

In addition to IRDs for NAS subsystem-to-subsystem interfaces, there are facility IRDs. Facility IRDs contain interface requirements between the NAS subsystem and the host facility. Facility interfaces are hardware interfaces resulting from subsystem designs requiring floor space, specific environmental control, an external power source, and other facility support. Facility IRDs provide necessary subsystem design requirements to support the installation design process. The IRDs are used by the facility design contractor as design requirements, and by the subsystem contractor as "not to exceed" requirements.

The ICWGs that address subsystem IRDs are chaired by the organization responsible for interface management (Engineering Specialties and Configuration Management Division, ASE-600). They are composed of systems engineering personnel and appropriate project personnel. Once subsystem IRDs are endorsed by the ICWG, they are signed by appropriate project offices and the NAS Systems Engineering Service (ASE-1). IRDs are baselined by the NAS Configuration Control Board (NAS CCB). Signatures on the IRD/IR page certify that the interface requirements are technically correct and that the signatories agree that the requirements can be implemented. Signing the IRD/IR does not imply that funding, schedule, project-level documentation and other requirements associated with the interface are resolved. These needs must be addressed by the NAS Change Proposal (NCP), and the data attached to it. The NCP must be approved by the NAS CCB. In addition, approval of an NCP does not allocate funding, it only assigns a cost for the implementation of an engineering change. A Financial Baseline Change Notice (FBCN) must be approved before funds are allotted as part of the financial baseline.

The ICWGs that address facility IRDs are chaired by the appropriate Facility System Engineering Division (AFE-100/200) responsible for facility IRDs. The facility IRDs are signed by project offices and appropriate Facility Systems Engineering divisions, and are baselined by the NAS CCB.

Interface Control Documents

ICDs specify the technical design of an interface. Initial development of ICDs is carried out by the lead PM. An ICD documents how interface design requirements shall be implemented. The major purpose of an ICD is to ensure that interface compatibility is established and maintained. This is done by documenting the form, fit, and function required to satisfy installation, checkout, and operation. ICDs must be compliant with the related IRDs and subsystem specifications. ICDs are required for all technical interface designs that are, or would normally be, controlled by IRDs. This includes interfaces among the NAS subsystems and between NAS subsystems and external subsystems.

The ICWGs that address ICDs are chaired by the lead project office and are composed of project personnel from each side of the interface, and associated contractors. Systems Engineering personnel may attend an ICD ICWG when there are design issues that relate to IRD requirements. When an ICD is endorsed by the ICWG, it is signed by the appropriate NAS project offices and the subsystem contractors. At that point, the lead project office baselines the document at the program/project CCB.

The change control process for IRDs and ICDs is governed by Order 1800.8F, NAS Configuration Management and FAA-STD-021, Configuration Management. Authority for IRD/ICD preparation and revision is through the use of interface revisions as described in FAA-STD-025. Agreed-upon revisions developed through the interface management process are then baselined through the change control process described in Order 1800.8F.

No change which affects interface compatibility shall be initiated in a design without following the appropriate revision and change control process. This rule does not apply to intra-subsystem interfaces that do not impact other subsystems.

Interface Revisions (IRs)

An Interface Revision is a documented change to a baselined IRD that is under configuration control. The procedure for the development of the IR is the same as it is for the IRD except that the IR can occur anytime after an IRD is baselined.

The IR, like the IRD, must comply with NAS-DD-1000 and NAS-SS-1000. Once the IR is incorporated in a revision of the IRD, the revised document becomes the requirements document for the interface.

Figure 12.1 is a diagram of the interface management process structure. Figure 12.2 is a diagram of the IRD/IR development and approval process.

Lessons Learned

Attempting to resolve interface issues without coordinating with Systems Engineering delays the issuance of approved IRDs.

Technical interface requirements of the NAS are generally not negotiable rather, they flow from NAS-SS-1000 which ensures compatibility and performance of NAS technical interfaces.

Project personnel need to have an acceptable ICD before their contractor begins building the interface. It can be costly and may have adverse schedule impacts if changes are required after interface construction has begun.

Due to delays in the contracting process, it is possible to have different versions of IRDs <u>on contract</u> to interfacing contractors. It is important all parties involved with the production of any ICD in this situation work to eliminate any problems this may cause the contractors.

Contractors do not realize the amount of effort required to draft, review, and finalize an Interface Control Document (ICD). Some contractors believe that providing preliminary and final ICD

drafts are the sum of their responsibility. It is recommended that the Statement of Work (SOW) should contain specific paragraphs that specify the Government's requirements for contractor involvement in the generation of ICDs. These paragraphs should list obligations such as coordinating with interfacing contractors, participation in Interface Control Working Groups (ICWGs) and Technical Interchange Meetings (TIMs), resolving technical interface issues, and the production of a baselined version of the ICD. It should be made clear that these responsibilities continue until an ICD is formally baselined. Interface Management has sample copies of a SOW, DID, and CDRL that discuss ICDs. Interface Management also has a draft letter for establishing ICD milestones with interfacing subsystems. Copies of these documents are available through Rebecca Taylor, ASE-600, 202-287-8649.

Responsibilities

Program Managers are responsible for ensuring that IRDs and ICDs are incorporated into acquisition contracts as compliance documents.

ASE-600 is responsible for the following:

- Interface management
- Subsystem IRDs
- Establishment of interface and network standards
- Definition of subsystem interfaces in NAS-SS-1000
- Technical content of subsystem-to-subsystem IRDs

AFE-100/200/300 are responsible for the following:

- Facility IRDs
- Definition of facility interfaces in NAS-SS-1000

Review and Approval

IRDs are reviewed by Systems Engineering and subsystem project offices and are approved by the NAS CCB.

ICDs are reviewed by the subsystem project offices and approved by the leading program/project-level CCB.

Contacts

The following divisions or groups can be contacted for additional information in the areas indicated:

- Subsystem IRD contacts are ASE-600 (202-287-8649) and SEI/SE&D (202-646-2314)
- Facility IRD contacts are AFE-100 (ARTCC/ACF) (202-287-8580), AFE-200 (ATCT) (202-287-8593), AFE-300 (AFSS) (202-287-8584), 'and SEI/SE&D (ARTCC/ACF) (202-646-2167) or (ATCT) (202-646-5774)
- NAS CCB operation information can be obtained from ASE-3.1 (202-287-8655) or SEI (202-646-6972)

Reference Documents

The following documents are the basis for the guidelines presented:

- Order 1800.8F, NAS Configuration Management
- FAA-STD-025, Preparation of Interface Documents
- FAA-STD-021, Configuration Management (Contractor Requirements)
- DOT/FAA/ES-85/01, NAS Interface Management Plan
- NAS-DD-1000, NAS Level I Design Document
- NAS-SS-1000, NAS System Specification

Point of Contact for Chapter 12 is Rebecca Taylor, ASE-600, 202-287-8649.

INTERFACE MANAGEMENT PROCESS STRUCTURE

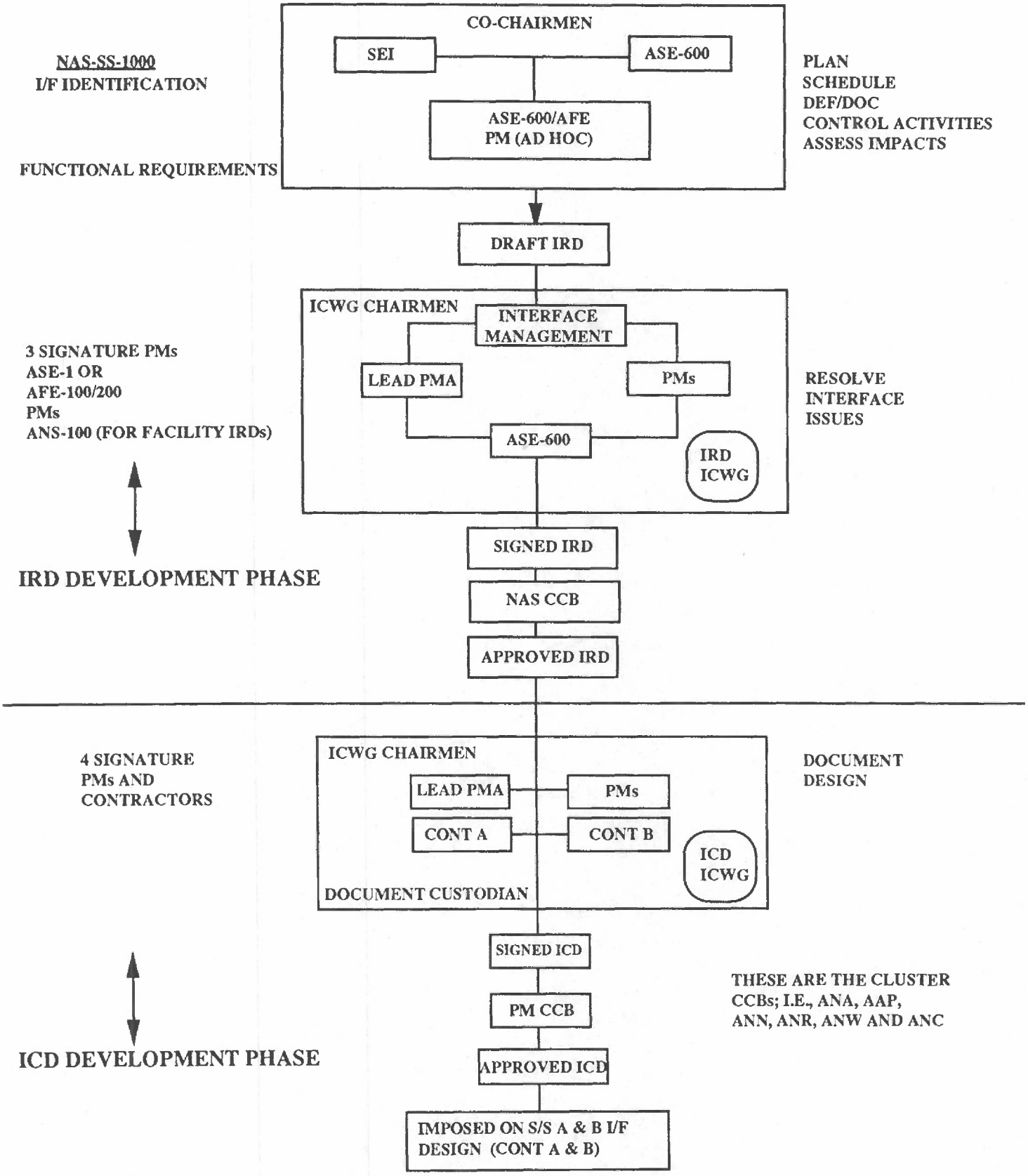


FIGURE 12.1

IRD/IR DEVELOPMENT AND APPROVAL PROCESS

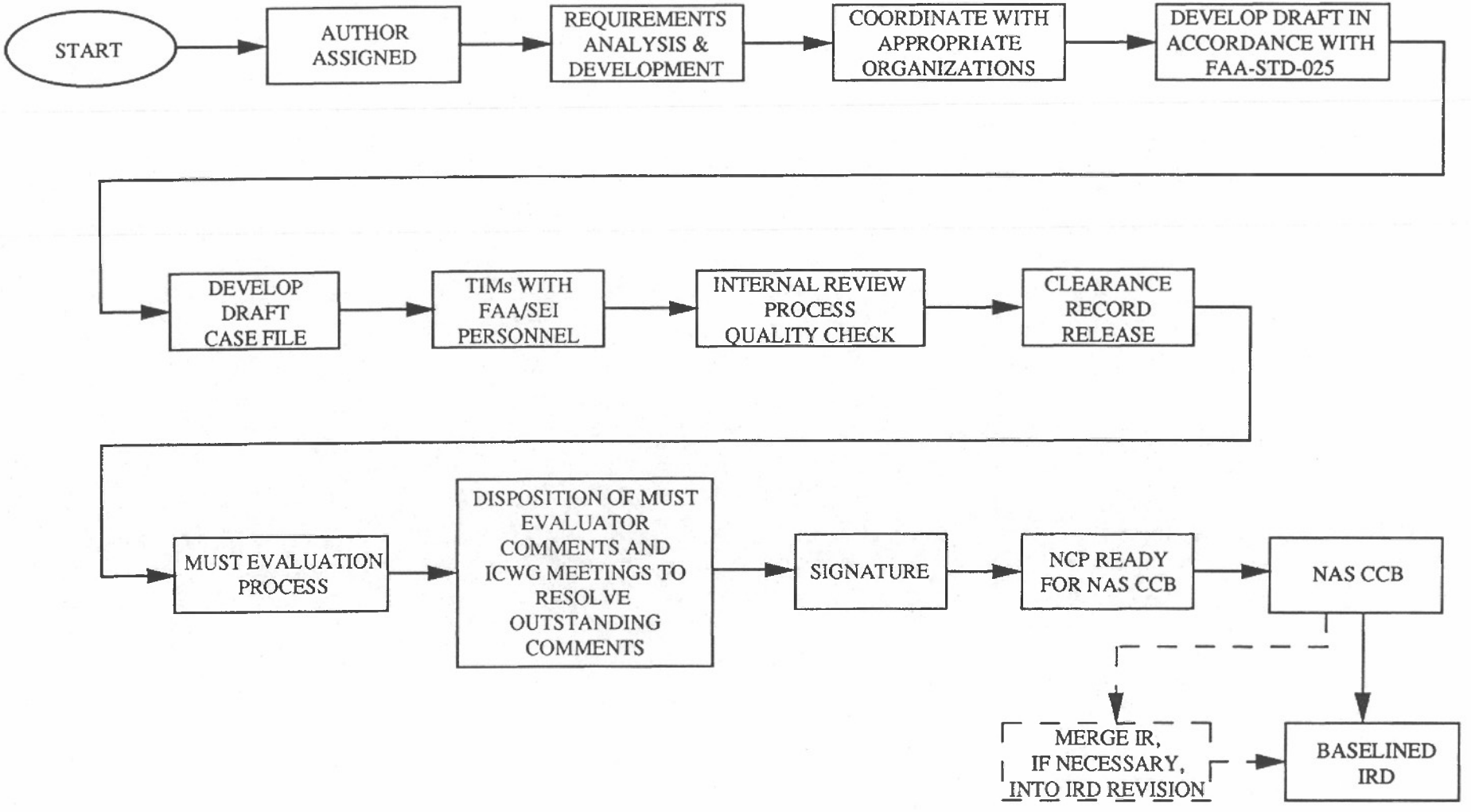


FIGURE 12.2

Chapter 13

Configuration Management

This chapter describes configuration management for the National Airspace System (NAS), including the Specification Review Board procedures.

Process Description

Configuration management (CM), an integral part of System Engineering, is the discipline used to identify and document the functional and physical characteristics of an item during its life cycle. Further, configuration management is used to control changes to those characteristics, and to record and report change processing and implementation status. Ultimately, CM is a tool for monitoring and controlling cost by providing visibility to requirements growth and requirements changes.

Central to CM is the concept of baseline establishment and management. A baseline may well be described as a snapshot in time of an item. Establishing a baseline initiates the formal change control process. This process ensures that all technical, cost, schedule, and interface aspects are considered before any change is approved and implemented. Changes to baselines can be made only following approval by a duly constituted CCB.

Order 1800.57A established the NAS CCB. The NAS CCB in turn established, through charters, subordinate CCB's to manage the change control process at the appropriate level. Charters for lower-level CCBs and operating procedures for each CCB have been approved by the NAS CCB. At the acquisition project level, there are program CCBs for each acquisition program within the Office of the Associate Administrator for Airway Facilities (AAF), and the Office of the Associate Administrator for NAS Development (AND). At the operational level, there are regional CCB's, an Air Traffic (AT) CCB, and a Maintenance Engineering (ME) CCB.

Configuration Management consists of configuration identification, configuration control, status accounting, and auditing. These functions are controlled and can be performed with the hardware and software design specifications, engineering drawings and the system technical instruction book. Any system can be configuration managed using the latest revision of the above documents.

Configuration Identification

Configuration identification is the aggregate of the family of technical documents including specifications, technical instruction, and drawings that describes the system or configuration item (CI).

NAS-MD-001, National Airspace System Master Configuration Index, defines configuration identification for NAS subsystems both fielded and in the acquisition process. Only CIs that are currently operational or in acquisition appear in this listing, along with the most current revision of their baseline documentation. NCPs are required to change or add CIs to NAS-MD-001. NAS-MD-001 contains the entire hierarchy of NAS CIs with all baselined documentation and approved documentation changes for each CI.

Based on the Level I Design Document, NAS-DD-1000, the Master Configuration Index shows parent-child relationships among the NAS subsystems. This index is updated with each publication of NAS-MD-001. It is part of the computer-based Documentation and Configuration Identification System (DOCCON) and is available to all FAA employees by remote terminal.

As part of the configuration identification, Orders 1800.8F and 1800.57A require that certain NAS-level documentation be baselined. Those documents are NAS-SR-1000, NAS-DD-1000, and NAS-SS-1000.

Specification Review Board

This section provides a reference to the Specification Review Board (SRB). The SRB was established by Order 1800.8 for the purpose of reviewing and endorsing all new specifications, and standards. The objective is to ensure complete and consistent NAS baseline documentation.

Process Description

Prior to writing a draft specification the program office should contact ASE-3.2, Configuration Management for a list of required reviewers and to obtain basic information about the review process.

Once the draft specification or standard is completed, a clearance record review is done using the list of reviewers provided by ASE-3.2. The final package, including the resolution of comments, is delivered to ASE-3.2, who will then organize and schedule an SRB and transmit the package with pertinent information to SRB participants. Generally, ASE-3.2 allows 15 to 30 days between distribution of the package and the scheduled SRB date to provide sufficient time for review. The SRB is the forum

for resolving remaining issues and the last opportunity to raise any issues which have been overlooked in the clearance record process. Program managers should make a good-faith effort to resolve outstanding comments and non-concurs prior to the SRB.

ASE-3.2 chairs the SRB and prepares and transmits the minutes. Assuming no further actions or resolutions are required, the specification is endorsed by the SRB and forwarded via a NAS Change Proposal (NCP) to the appropriate Configuration Control Board (CCB) for signature. The CCB Chairperson's Signature on the CCD baselines the specification. For most specifications, the appropriate CCB will be the sponsoring program directorate CCB. Specification numbers are assigned by ASE-3.2 following endorsement by the SRB.

The SRB process for new standards is the same as for specifications. However, when a new standard is endorsed by the SRB, it is transmitted via an NCP to the NAS CCB for approval.

Responsibilities

Program and project office responsibilities:

- Coordinate with ASE-3.2 for list of reviewers and tentative schedule
- Prepare the draft specification document
- Coordinate the clearance record review of the draft document
- Resolve reviewers' comments
- Coordinate date of the SRB with ASE-3.2
- Provide copies of draft document and resolution of comments for SRB
- Prepare the NCP following approval by the SRB

ASE-3.2's responsibilities:

- Provide guidance on the entire SRB review process
- Organize and coordinate SRB activities
- Act as chairperson for SRB meetings
- Provide secretariat support
- Publish minutes of the SRB

- Assign specification numbers to approved documents

SRB members attend the SRB, provide comments, and participate in the resolution of comments.

Lessons Learned

Diligently resolving all comments and issues received during clearance record review of the document will ensure SRB effectiveness and save time. It is important to work closely with program offices which may be impacted by the new project.

Review and Approval

FAA specifications are reviewed by the SRB. The SRB forwards a recommendation for final approval to the CCB. The CCB approval constitutes final approval following which the document will become a baseline.

Configuration Control

The configuration control or change control process is essentially the same for all baselines regardless of the controlling CCB. The general process consists of the following steps:

- Office proposing a change to a baseline develops a case file. A case file can be initiated by any FAA organization against any NAS related CI. (See Appendix A for a sample of FAA Form 1800-2)

- The case file is pre-screened for completeness by the organization responsible for that particular baseline. In the event the proposed change impacts several baselines, the controlling CCB is the CCB responsible for the highest level baseline impacted.

- If the case file passes the pre-screen process, ASE-3.2 assigns an NCP number and sends it to the appropriate reviewers for evaluation and comment. Reviewers generally include those organizations that have an interest in or are impacted by the proposed change.

- The NCP originator resolves all received comments. Case file originators should take an active role in notifying reviewers ahead of time to let them know that their proposed change will be coming their way.

- For NAS CCB meetings, the originator must supply ASE-3.2 with the NCP meeting package and the briefing that will be given to the board at least two weeks in advance.

Evidence that all comments have been resolved must be included. Each individual scheduled to appear before the NAS CCB must present the proposed change to a NAS pre-board held one week earlier.

- Preparation procedures for CCB meetings other than the NAS CCB vary somewhat. NCP originators should consult the operating procedures of the respective CCB.

Configuration Status Accounting

Configuration status provides for establishing a configuration baseline, accounts for and traces changes, and facilitates the implementation of changes.

The FAA employs a computer-based configuration status and accounting system, DOCCON, to support the configuration status function.

Review and Approval

NCPs are reviewed by the appropriate reviewers and approved by the CCB responsible for the baseline document under consideration.

NCPs which impact more than one baseline document are approved by the CCB responsible for the highest level baseline document affected.

Project Planning

Since appropriate application of CM in a project can provide a high degree of visibility into contractor performance, it is important for program managers to coordinate with ASE-3.2 as early as possible in project planning. Coordinate with ASE-3.2 wording of CM requirements for the Request for Proposal (RFP) and for inclusion of the appropriate CM data items, such as a CM plan, configuration status accounting data, and configuration audit plan.

ASE-3.2 participation in NAS Integrated Logistics meetings (NAILSMTs), technical interchange meetings (TIMs), and design reviews is important.

Configuration Audits

Configuration audits validate that functional and performance requirements are achieved and that product configuration is verified by comparing the CI with its technical documentation. Both functional configuration audits (FCAs) and physical configuration audits (PCAs) are performed.

The FCA and PCA is normally held between two key events during the acquisition. The first event is first article testing at the contractor's plant, FAA Technical Center, or an FAA key site. The second event is the baselining of the First Article at the product level within the NAS. All testing should be completed on a CI before an audit is conducted.

The FCA determines whether the actual performance of each CI complies with its controlling specification. Particularly, an FCA must verify that the functional, allocated (if applicable), and proposed product baselines are consistent. The FCA verifies that functional requirements are traceable from the system level specification (Type A) through the design documentation, test documentation and to the test results. The FCA can vary according to the type of CI being audited. For example, the FCA for a complex CI may be conducted on a progressive basis throughout the CI's development. The FCA will normally begin at the completion of design qualification testing with a review of all discrepancies at the final FCA.

The PCA is a formal examination of CIs and technical documentation to ensure a match between the technical documentation and the "as-built" CIs. Successful completion of the PCA is a prerequisite to establishing the product baseline. After PCA, all subsequent changes to product baselines are submitted to the FAA via a Class I Engineering Change Proposal (ECP).

All audit activity must be complete and approved before establishing the product baseline. The contract must have the FCA/PCA included in project milestone schedules. If the FCA/PCA is not included in project schedules, the program management office, in collaboration with ASE-3.2 and ASU-300, must determine the proper time for FCA/PCA activity.

Lessons Learned

NCPs which do not thoroughly describe the problem, do not adequately describe the proposed solution, and those lacking support documentation do not receive proper review and may need to be returned for rework thereby delaying approval of the change proposal.

It takes considerable time to plan and conduct FCAs and PCAs for complex CIs. Allow sufficient time for feedback to the contractor and correction of any deficiencies found during the audits.

Responsibilities

Program managers are responsible for the following:

- To coordinate with ASE-3.2 very early in project planning
- Ensuring that FAA-STD-021 and other CM related standards are included in all contracts in accordance with Order 1800.8F
- Ensuring that contractors meet contract CM requirements
- Ensuring that contractor Engineering Change Proposals (ECPs), Deviations and Waivers are processed in accordance with FAA-STD-021
- Establishment of appropriate CM baselines
- Initiating appropriate NCPs to higher level boards when required

Contacts

The following groups can be contacted for additional information in the areas indicated:

- Configuration management issues, ASE-3.2, 202-287-8653, 202-287-8654, 202-287-8657
- NAS CCB business, ASE-3.2, 202-287-8653
- CM policy/procedures, ASE-3.2, 202-287-8653, 202-287-8654, 202-287-8657
- FAA-STD-021, ASE-3.2, 202-287-8653
- DOCCON/CM tools, ASE-3.2, 202-287-8654
- CM audits, ASE-3.2, 202-287-8653, 202-287-8654, 202-287-8657
- Acquisition CM
  - AAP CM (AAS), ASE-3.2, 202-287-8654
  - AAP CM (VSCS), ASE-3.2, 202-287-8654
  - AND CM, ASE-3.2, 202-287-8653
- Air Traffic, ASE-3.2, 202-287-8657

- ME CCB, ASE-3.2, 202-287-8657
- Configuration Management Officers (SEIC)
  - AAP-200, 202-646-5353
  - AAP-400, 202-646-4855
  - ANA, 202-646-6976
  - ANC, 202-646-2191
  - ANN, 202-646-4851
  - ANR, 202-646-5881
  - ANS, 202-646-2321
  - ANW, 202-646-2321
  - ARD, 202-646-2321
  - NAS, 202-646-6992
- Change Control & Status Accounting, 202-646-2203
  - NAS CCB, 202-646-6972
  - ANF, ANN, ANW, ARD, AT CCB, 202-646-2091
  - ANA, ANC, ANR CCB, 202-646-5552
  - ME CCB, 202-646-2236
- Master Configuration Index, 202-646-5492, 202-646-5928

Reference Documents

The following documents are the basis for the guidelines presented:

- Order 1800.8F, NAS Configuration Management
- Order 1800.57A, Establishment of the National Airspace System (NAS) Configuration Control Board
- FAA-STD-002, Preparation of Engineering Drawings
- FAA-STD-005, Preparation of Specification Documents
- FAA-STD-021, Configuration Management (Contractor Requirements)

- MIL-STD-973, Configuration Management, Paragraph 5.5 Configuration Status Accounting, & Paragraph 5.6 Configuration Audits

- NAS-MD-001, NAS Subsystem Baseline Configuration and Documentation Listing

- NAS-DD-1000, NAS Level I Design Document

- NAS-SS-1000, NAS System Specification

- NAS-SR-1000, NAS System Requirements Specification

- FAA Form 1800-2, NAS Change Proposal (NCP) Form

- CCB Charters and Operating Procedures - Charters and operating procedures for program CCBs (acquisitions), regional CCBs, the AT CCB, and the ME CCB

- Guidance and Implementation Planning for the Conduct of Formal Configuration Audits, Revision 5, dated January 29, 1988 - Guidelines published by SEIC for ASE-3.2 for the planning and conducting of PCAs and FCAs

- Configuration Management Procurement Guidance, Revision 4, dated October 26, 1989 - Guidelines published by SEIC for ASE-3.2 for the application of FAA-STD-021 on project acquisition contracts

Point of Contact for Chapter 13 is Daryl Wyrick, ASE-3.2, 202-287-8654.

Chapter 14

Standards And General Specifications

This chapter provides a reference to the selection and application of standards and general equipment specifications for NAS acquisitions.

Process Description

FAA, military, and DOD standards and general equipment specifications are documents that establish engineering and technical requirements for processes, procedures, practices, and methods that have been adopted as standard. General equipment specifications and standards are employed to give programs the benefit of previous experience, to promote commonality, and to minimize logistics costs. Implementation of specific standards, however, must be carefully considered to ensure that these general standards and specifications do not create unnecessary costs for the program, that the standards represent current acceptable technology, and that tiering is minimized. Tiering is the incorporation of standards due to cross-referencing at successively lower levels.

The development of project specifications and statements of work that utilize standards and general equipment specifications requires the following two steps:

- Selection of standards for application
- Application of the standards

Selection of Standards for Application

In selecting standards for application to a specific project, the following documents should be consulted:

- NAS-MD-001, NAS Subsystem Baseline Configuration and Documentation Listing
- NAS-SS-1000, NAS System Specification, Volume I, Section 2.0, Applicable Documents

- Order 1830.2B, Telecommunications Standards Selection and Implementation Policy in conjunction with FAA-STD-029, Selection and Implementation of Telecommunications Standards, and FAA-STD-039, NAS Open System Architecture and Protocols

- Order 1800.8F, NAS Configuration Management, Appendix 3 (replaces Order 4405.G, Specification Currency List for Procurement in the Air Traffic Control and Navigation System, which is out of date)

Each standard should be reviewed as to applicability to the particular project and tailored for use. For example, if the objective of the project is to develop new electronic equipment to provide the required functions, the general specification, FAA-G-2100, Electronic Equipment, General Requirements, would be selected and tailored for new development. If the required functions can be provided by commercial off-the-shelf (COTS) or non-developmental item (NDI) products, then FAA-G-2100 must be tailored for COTS/NDI. A tailoring guide for NDI/COTS is included in the revised FAA-G-2100F.

Application of Standards

Before selected standards are incorporated into the contract, they should be tailored. There are a number of appropriate ways to tailor standards or general equipment specifications. The application of a standard may be limited to specified components or types of components within the system. Applicable portions of a standard may also be extracted for incorporation into the text of a project specification. In either case, a referenced standard may be supplemented by descriptive text in the specification which clarifies the intended requirements or application. Inapplicable portions of a standard may be deleted by identifying them in the system/equipment specification or appendix thereto. The following is a specific tailoring example: FAA-G-2100F, paragraph 3.3.1.3.4.16.5(e), specifies that terminal boards used in interconnecting units shall have 10 percent extra spare unused terminals, but in no case less than two. A program manager may decide that the requirements of his/her particular program need at least four spare terminals. The program manager may indicate this requirement in the specification along with a specific exemption to FAA-G-2100F, paragraph 3.3.1.3.4.16.5(e).

Specific guidance on tailoring software specifications may be found in Chapter 15, Software Acquisition Management. Tailoring specifications for software acquisitions is especially important to the later success of the overall program. For this reason, it is treated in a separate chapter.

Where standards impose requirements for delivery of data and reports in contracts, the appropriate contract data requirements are to be specified in the Contract Data Requirements List (CDRL). The CDRL items should specify the appropriate data item descriptions that have been tailored in Block 16 of the CDRL form to delete inapplicable requirements.

Configuration management should start in the requirements phase. This will ensure that the project baseline is developed and that the acquisition is totally documented. The configuration management contract deliverable requirements should be identified in the Statement of Work (SOW) and in the CDRL/Data Item Description (DID) to ensure contractor compliance in configuration management.

Lessons Learned

The tailoring of standards is a labor-intensive task. Be sure to allot sufficient time and resources during preparation of procurement requests and RFPs for this task. In addition, be sure to assign sufficient staff with the necessary skills and information. Improper tailoring of the standards that are invoked can lead to considerable unnecessary costs to a project.

In cases where a specification is sent to industry for comment prior to finalizing, request industry to provide recommendations for tailoring the standards referenced in the specification.

Responsibilities

The PM is responsible for the selection, application and tailoring of standards for consistency with NAS System Specification objectives, operational, NAILS and maintenance requirements, and cost considerations.

Review and Approval

FAA specifications are reviewed through the Specification Review Board process. At the completion of this process, the specification is baselined by the division CCB. Any changes to technical standards or general equipment requirements after the specification has been baselined must be made through the configuration management process.

Contacts

Additional information concerning technical standards and general equipment requirements can be obtained from:

- ASE-600, 202-287-8644, Engineering Specialties
- ASE-3.1, 202-287-8654, Configuration Management

Reference Documents

The following documents are the basis for the guidelines presented:

- NAS-MD-001, NAS Subsystem Baseline Configuration and Documentation Listing
- NAS-SS-1000, NAS System Specification, Volume I, Functional and Performance Requirements for the NAS, General
- Order 1830.2B, Telecommunications Standards Selection and Implementation Policy
- Order 1800.8F, NAS Configuration Management
- FAA-G-2100F, Electronic Equipment, General Requirements*

Point of Contact for Chapter 14 is Rebecca Taylor, ASE-600, 202-287-8649.

* FAA-G-2100 has undergone major revision. The specification is designed to be tailored for COTS and NDI procurements. A tailoring guide has been included. Format is consistent with FAA-STD-005.

Chapter 15

Software Acquisition Management

Introduction

This chapter describes the issues and activities involved in the management of system acquisitions which include software components. It identifies the major causes of software acquisition problems, outlines the software development process, and describes the various goals, issues, information requirements and management strategies and activities for each phase of the software acquisition effort.

The Software Problem

Dr. Winston W. Royce, a pioneer in software process research, said in 1987: "The construction of new software which is pleasing to both user and buyer, and does not contain errors, is an unexpectedly hard problem. It is perhaps the most difficult problem in engineering today. It is often referred to as the 'software crisis'. It has become the longest continuing 'crisis' in the engineering world, and it continues unabated."

Software development is truly the "tar pit" of system development. It is all too frequently characterized by computer-based systems that did not meet user's requirements, software that failed when needed, or exceeded its development budget, or overran the schedule, or that was used once and could not be reused, or that could not be reasonably maintained. The problem is exacerbated by senior managers who typically are more comfortable with hardware development and may not be software literate; they do not recognize or understand the major issues of software development, are unimpressed by current software development technologies, are unwilling to invest in training, and fail to accept that software is an engineering science requiring analysis and design. As a result, managers tend to underbid or underfund software development. Software customers also contribute to the quagmire by placing primary emphasis on computer hardware, rather than software, by underfunding software development, by underestimating the schedule demands, and by failing to adequately establish user needs and requirements. Also, too many software engineers oversell their product and/or are trained as programmers rather than as software engineers.

Software is invisible and intangible - simply the state of electronic components. Its strengths and its weakness both lie

RESOURCE:
The FAA offers two particular training courses which every Program Manager and APME should investigate. These are the **Program Management Course** (4-week,2-week and 4-day versions are offered) and the **Software Acquisition Management Course** (2-week and Executive versions are offered). These courses are available through your division training coordinator.

in its inherent flexibility. Software should be considered as a set of representations of an intellectual concept. The more people involved with intimately understanding that concept, the more difficult it becomes to maintain consistency and direction. This is the reason software has very specific limits with respect to productivity, and why the difficulties rise exponentially with the size and complexity of the software developed.

The "soft" in software does not mean un-engineered, although software development may involve approaches and methodologies which may be new to you. Software development is at least as complex as pure hardware development. Because of software's malleable nature, the engineering discipline that we normally expect from a hardware development is even more critical in software engineering. Even if you are responsible for an acquisition rather than the actual development effort, remember that it is almost impossible to manage or control a software acquisition project without intimate familiarity with the techniques and methods used by your contractor.

Managing a software development or acquisition requires a great deal of planning, considerable understanding of and insight into the development process as implemented by the contractor, the ability to distil truth and meaning from an avalanche of information, and in some cases a good deal of just plain luck.

The following sections approach software development from that perspective, and particularly from the point of view of the Program Manager (PM) and the Government Technical Representative (GTR), i.e. Technical Officer's Representative (TOR), Contracting Officer's Technical Representative (COTR), or Contracting Officer's Representative (COR) in an acquisition setting.

The Software Process

The software engineering process is not a whole new entity. It draws heavily from traditional system engineering in that it is based on establishing requirements, doing trade-offs, allocating requirements, analytically and systematically decomposing requirements, tracking interfaces and assuring component and system compliance with requirements. The product of the engineering process is a set of documents -- not a widget. Development and production fall out of the engineering process. This is especially true of software, since the actual product is essentially an engineering representation.

Software Lifecycle Models

Waterfall Method -This traditional government methodology consists of a single set of distinct development phases for the system as a whole. It involves a large, complex integration stage, and there is no demonstration of system capabilities until project end.

Incremental Development - The software system is broken down into components, each component proceeding independently, being integrated with earlier products during test. Sometimes referred to as the "build" approach. Advantages: opportunity for user feedback, initial operating capability before project completion. Disadvantage: difficult or complex requirements could be postponed to later increments, partition must exist..

Evolutionary Development -This offshoot of the incremental development method is used when complete product requirements cannot be determined before development begins. Sometimes referred to as a prototyping method. Distinct from so-called "rapid prototyping" in that formal requirements, process, and documentation standards are religiously followed.

One way to view the software development process is through a model or set of steps. Several models have been developed over the years, and each has its strengths and weaknesses (see sidebar). All of the models, however, depend on the applicability to the task and integration with the developer's processes to be useful. The PM or APME may decide to utilize a particular lifecycle model to enhance visibility of certain parts of the acquisition, or to mitigate risks associated with the project.

Software engineering is comprised of several activities all with the goal of ensuring the system designed and built meets the user's requirements. It takes as its inputs the set of requirements allocated to software by system engineering. This single fact points out the immense importance of proper system engineering. If the software is not part of the system engineering decomposition and is simply the leftovers that didn't fit on the board, the success of the project is almost impossible.

The software engineering activities can be summarized as follows:

Requirements Analysis and Decomposition - This activity consists of formulating and restating the requirements allocated from the system engineering process and identifying "derived" requirements which are necessary to meet those that are allocated. These derived requirements are then hierarchically decomposed into sets of smaller subsets until, at the bottom level, there exists a set of subsystems which are of manageable size to build. Each subsystem has explicit requirements. This process results in software requirement specifications and software test plans.

Interface Control - Software system engineering is the keeper of the interface specifications among the software subsystems and modules. As problems require the redefinition, rethinking and change of subsystems, the software system engineer ensures that the interfaces with other subsystems remain viable.

Software Design - The design stage of software engineering consists of determining the software system architecture and

allocation of requirements to the module level. This architectural design is usually the most critical area in software systems. Once the architecture is established, detailed design consists of describing the interfaces between modules, the data structures, the input/output details, any timing and memory constraints, and the detailed documentation of the program flow. Test cases for each of the allocated requirements are also developed. This stage is normally accomplished by programmer/ analysts or programmers.

Coding and Unit Testing - This is the actual programming of the system from the detailed flows created above, and if all previous work has been done well, should be relatively straight forward. Once a module has been coded, it is tested against the test cases developed in the system design to observe the output.

Integration of Software Units into Systems - As each of the hierarchical design levels are coded and unit tested, they are built back up into larger and larger modules and tested together. Once the entire software system has been built and tested, it is provided to the system engineers for hardware/software integration and system level testing.

Operations and Maintenance - Although not strictly a software engineering phase, many problems and/or changes in requirements show up only after the system enters operation. Such changes lead to an iteration in the development cycle to accommodate the modifications. Obviously, software which has been crafted with maintenance and modification in mind is much more maintainable than otherwise.

Software Acquisition Management

Now that we have a general feel for what the developer's supposed to be doing, we can address the PM and APME responsibilities and activities. The management tasks fall into 4 roughly sequential phases: Planning, Evaluating Offerors, Monitoring the Development, and Supporting (Surviving) OT&E. OT&E is addressed in Chapters 6, 7, and 8 of this Guide.

Software Acquisition Planning

The most important phase in software acquisition is the preparation for issuing the Request for Proposals. The PM and APME are responsible for their own destiny, since everything that they will want or need to do during the contract must be planned for before the contract is awarded.

> Planning Goals: The primary goals of the planning activity are to establish a supportable, consistent strategy for managing the software acquisition and to develop a Statement of Work that supports that strategy.

Planning Issues: The major issues in this phase are resources, requirements volatility, schedule and risk.

Required Information for Planning:

- Size and complexity of software (estimate)
- Safety critical software requirements
- Preliminary Risk Assessment
- Commercial Off The Shelf (COTS) products which might be used
- Quality of requirements or specification
- Budget and other resources

Planning Strategies and Techniques:

The Software Acquisition Management Plan (SAMP): Of primary importance to the acquisition manager is a software management plan. This outlines the scope of the software development, the schedules for the various reviews, describes what documentation will most likely be provided, who will review it and how, and what resources are available to support the APME or GTR. This is also the place to begin to determine what, if any, management or software metrics will be required, what tools might be utilized, how the Government will monitor the technical development, and other technical and management questions which will need to be addressed in the Statement of Work.

RESOURCE:
The Software Engineering Specialty Group (SESG) in ASE-600 can provide or is currently establishing guidelines and/or handbooks for many of these documents and techniques as applied in the FAA. They also have consulting resources for special needs. See the contacts list at the end of this chapter for further information.

The Concept of Operations (CONOPS) Document: This document describes in user terms how the system should work. It is written by the user early in the program initiation phase, and becomes the basis of formal requirements analysis later in the program. The CONOPS is presented as a section within the Operational Requirements Document. The new version of DOD-STD-2167 (to be called DOD-STD-498), upon which FAA-STD-026 is based, contains a Data Item Description for a complete CONOPS document.

The Statement of Work (SOW): Each project has a single statement of work, and software may be a small part of it. However, no document is more important in designating to the contractor what he is required to do. The SOW is a contractual document, and the

Government will live with it throughout the contract life. Thus, it behooves the PM and GTR to craft the SOW very carefully. This document is prepared for inclusion in the Request for Proposal (RFP) which is sent to contractors soliciting a bid. Items to be addressed should include reporting requirements for metrics, specification of programming language, documentation formats (electronic or paper), risk management, technical teams and support for Government access to the work products in progress.

Work Breakdown Structure: The Work Breakdown Structure (WBS) is one of the best ways to get an understanding for the project at hand. By creating mini-plans, called work packages, for each low level task it is possible by summing up the hierarchy to estimate the cost, resources, and schedule for each activity up to and including the entire project. The WBS can be created in many different ways, depending upon how the work is visualized. However, those WBSs which are most effective are closely related to the product breakdown structure or interleave products with processes. This approach yields a breakdown based on finite objects, the products, and allows effective delegation of control as well as responsibility for product completion. A WBS which describes too many functions (on-going, level-of-effort activities) rather than products tends to have no one responsible for anything, except at the highest levels. This prevents PMs from using the WBS to benefit the project planning and organizing. The WBS provided in the typical solicitation for a typical project is three or four levels deep, but in a large project may go to the eighth level, or more. You may wish to specify a desired or required WBS in the RFP or you may use the Government developed WBS for comparison against proposed WBSs. You should specify to which level the WBS should be tracked and to which it should be reported. A good rule of thumb is to have the contractor track to two levels deeper than you wish reported.

Size, Cost and Schedule Estimation: The Government cost estimate is a primary means of evaluating proposals; however, estimating the size of the software component of a system is essential to all planning activities. It is also very difficult and should be left to experts whenever possible. Some estimation techniques are described in the sidebar, but seek advice wherever possible and never use only one estimating technique for your planning.

Risk Management Plan: Before an RFP is released or a contract is awarded the PM and APME should develop a risk

Estimation Techniques

Estimation by Analogy - Size is estimated by using the results of another similar project. It is inaccurate if the analogy is not exact, and fails completely for first-of-a-kind systems. It is not recommended.

Rule-of-Thumb -This method involves using guidelines (rules-of-thumb) for estimation. For example, if we believe the system requires 45K lines of source code, and we know that our productivity is 150 lines of code per staff month (the rule-of-thumb), then the job will take 300 staff months of effort. This method is generally used a sanity check.

Design to Cost and Schedule - This is really an engineering approach. If we have 10 people and 18 months available, and our typical productivity rate for such a system is 200 LOC per staff month, we estimate we can design, build, and test 36,000 lines of code.

Bottom-up WBS Estimation - If the project has been subjected to WBS analysis, the bottom level tasks may be estimated and then rolled up into an overall estimate. This is probably the most reliable method of estimation, if all facets of the project are understood.

COCOMO - This is one of several modeling techniques for estimation which are constructive; they take historical data and "construct" a formula. The equations are tuned by applying effort factors based on cost/schedule drivers. This technique is only valid if the equations and factors have been tuned and validated using historical data from the organization involved.

Function Points - This method counts inputs, outputs, queries, files, and interfaces. These are then weighted according to complexity and adjusted by various factors to obtain an estimate.

management plan (RMP) which specifically deals with software issues. This may be part of a larger RMP or the software development plan, but it is an important means of determining areas for special consideration in the SOW generation and proposal evaluation activities. For example, development metrics or technical performance parameters are often used to provide trigger information for contingency plans, and therefore must be specified as part of a deliverable in the SOW. Particular technological risks, such as algorithm stability, may require more experience from the company and thus affect the technical evaluation rankings. You should become familiar with the types of risks encountered in software development, and prepare a risk mitigation plan. The Software Capability Evaluation process described beginning on page 15-8 can provide valuable insight into risk areas for each particular contractor as well as the project as a whole. Training in this area is offered in the Software Acquisition Management course.

Standards and Documentation: The FAA standard for software development is FAA-STD-026. This standard points to DOD-STD-2167A and levies additional FAA specific requirements. FAA-STD-026 is the most comprehensive and consistent software standard available for managing FAA software contracts. Both standards specify all documentation, formal reviews, and audits which could possibly be required on any software project which uses the methodology. The mechanism for such document specification is the data item description (DID). The PM and APME are expected to extensively tailor (i.e., customize) all SOW, documentation requirements and specifications before including them in the RFP. Other FAA standards with which the PM and GTR should be familiar include RTCA DO-

Risk Management Basics

Risk is the chance that something undesirable will happen, for example an overrun of the schedule or budget. A situation is considered a risk if uncertainty is involved and a loss is involved. *Risk exposure* is the product of probability of the risk times cost. A *problem* is a risk that has materialized. The goal of risk management is to identify potential problems and respond with sufficient lead time to prevent them from becoming real problems, or to mitigate those that cannot be prevented.

Risk management differs from traditional project management in that it attempts to identify and prioritize risks at the outset, plan and track risk factors, and respond to problems. Risk management augments traditional project management techniques. *The key to controlling risk lies in generating and using well-developed contingency plans.*

178B which describes the certification of avionics software and the Ada development language specification MIL-STD-1815A. DO-178B can be used in conjunction with or in lieu of FAA-STD-026, particularly for contractor maintained systems.

Evaluating Software Developers

Obtaining a contractor with a good chance of success in a software project is not a trivial task. This section describes the three activities which can best improve your chances of getting a competent software developer - the Software Capability Evaluation, the Software Development Plan, and the Evaluation Criteria used in Sections L and M and in the Technical Evaluation Plan.

Evaluation Goals: The primary goal in this phase is to make sure that the contractor selected for the acquisition (and/or the subcontractor(s) responsible for the software) is capable of performing the development with a significant chance of success within schedule and budget constraints.

Evaluation Issues: The major issues in this phase are the technical evaluation criteria, the weighting of those criteria, and the validity of the information used to evaluate the offerors.

Required Information for Evaluation:

- Size and complexity of software (estimate)
- Risk Management Plan
- Technical Evaluation Plan and Materials
- Safety critical software requirements
- Likely number of bidders and/or software subcontractors

Evaluation Strategies and Techniques:

The Software Capability Evaluation Process: Probably the most effective tool for evaluating the capabilities of a

RESOURCE:
Automated tools are available to support the tailoring process along with a draft handbook, *Tailoring Guide for FAA-STD-026 NAS Software Development Using the Logicon 2167A Tailoring Tool*. The SESG is planning a Consultation Lab whose main purpose is to facilitate the tailoring of standards and the preparation of RFP packages. Training is also offered by the SESG on a periodic basis in this area.

software contractor is the software capability evaluation (SCE). This is an audit-like activity which involves a site visit by a team of 3-6 trained evaluators to each of the offerors and/or their software subcontractors being considered. The evaluation is based on work performed at the Software Engineering Institute, a FFRDC at Carnegie Mellon University. The SCE uses a well-documented and historically validated process to evaluate the contractor in 18 Key Process Areas. The results may be used to determine probability of success, areas of risk, and overall maturity of the organization evaluated. The process is not inexpensive - the average cost is between $15-25K per evaluation performed - but it has been shown beneficial to both the acquiring agency and the offeror. The project needs to consider the weight the SCE will have in selecting the successful offeror.

RESOURCE:
Bruce Siebenthall, Rich Turner and John Hamilton in ANN-500 have been involved with the SCE process and can provide more detailed information. Additionally, the SESG is studying the FAA policy with respect to SCE and has several SEI-trained individuals. An example of a SAMP can be obtained from Bruce Siebenthall. SESG is working on a set of guidelines for the SAMP.

The Software Development Plan: Experience has shown that the Software Development Plan can be effectively used as the basis for acquiring software development information in the proposal. This plan describes the manner in which a satisfactory software product will be achieved within the schedule and budget constraints. It specifies the processes the contractor will use to build a system that satisfies the requirements specification and SOW. It also specifies the software products to be developed, the organizational relationships of the project, the roles and responsibilities of development personnel, the reporting and control mechanisms, the tasks, schedules and staffing, and the plan for updating the software development plan. There are sections on testing, configuration management, and product evaluation. This plan is of particular value in that it indicates the contractor's breadth and depth of planning. It allows the Government to assess the consistency of cost, schedule, and resource estimates, and shows the contractor's understanding of the project. Additionally, it provides a basis for assessing progress and for controlling the project. The software development plan is described in FAA-STD-026, which points to DOD-STD-

2167A, and Data Item Description (DID) DI-MCCR-80030A. FAA-STD-026 and the DID can be used as the source for proposal requirements, criteria, and guidance to insert in Sections L and M of the RFP. By including the plan requirement and associated efforts in the SOW and contract data requirements list, it will become a binding part of the contract. When evaluating SDP information, look for specifics, particularly examples from previous projects. Don't accept motherhood or boilerplate. If the contractor can't be specific about exactly how their software development will be performed in the proposal, they certainly will have a very little chance for success in the heat of the development effort. SDP type information provided in the proposal should, if possible, be corroborated by the results from an SCE.

Evaluation Criteria and Scoring: The basic strategy in determining evaluation criteria is to isolate those areas which will provide the most discrimination between superior contractors and the rest of the pack. This can be accomplished within the context of risk assessment, technology evaluation, or from the experiences of similar projects. Of major concern is that whatever criteria are determined to be important not be buried at so low a level that they have no bearing on the technical scoring. One way which has been effective is to make a reasonable percentage (30-50%) of the technical score directly based on the SCE results and/or the SDP information evaluation. One factor often overlooked in evaluations is the information provided to the FAA evaluators. The Technical Evaluation Plan should be detailed enough to provide guidance to the reviewers as to what is acceptable and what is not with respect to software. Comprehensive evaluation materials are worth their weight in gold when you have a large evaluation team, not to mention their value in the case of a protest.

Monitoring Software Development Activities in Acquisition

The day-to-day monitoring of a software development project can be challenging at best and a nightmare if approached in a laissez faire manner. Much of the success of this effort, however, depends on how well the planning and evaluation activities were performed. It may be necessary to modify contracts where the planning was insufficient. While this may result in overall higher costs, the probability of success should increase enough to where it is larger than the probability of failure.

Monitoring Goals: The primary goals of the monitoring activity are to maintain planned cost and schedule and to ensure project success.

Monitoring Issues: The major issues in this phase are information accuracy and management, contractor access, requirements volatility, schedule and risk management.

Required Information for Monitoring:

- Statement of Work
- Risk Management Plan
- SAMP
- Metrics
- SDP

Monitoring the Development: Monitoring software development does not occur in a vacuum, and it is at least useful, if not essential, to integrate the software monitoring with the rest of the program management effort.

Cost Performance Reporting: Most programs will include a cost performance reporting system in major contracts. These systems require the contractor to establish a work breakdown structure (WBS) for the contract, estimate the cost for each WBS element and report on actual costs and work completed periodically at an agreed upon level of detail. This technique is especially useful in software and hardware/software integration because the most significant costs are associated with labor and the product can not be physically seen until very late in the process. Planning and requirements for cost and progress reporting for software should be integrated with the program cost performance reporting requirements. This allows a common WBS, common terms and definitions, and common or integrated significant milestones.

Program Management Reviews and Surveillance Plan: Periodic program management reviews and associated contractor deliverable data are designed to assist the Government in monitoring progress of the contract. Requirements for these reviews and associated data deliverables are included in the statement of work and contract data requirements list. In complex acquisition situations it is helpful to prepare a surveillance plan describing the activities and responsibilities of the various Government organizations monitoring the contractor. This can help avoid duplication of effort, improve communications and decrease the chances of Government organizations working at cross purposes. The surveillance plan can be incorporated as part of the SAMP.

Contractor Plans: Contractor internal plans for management, metrics, reporting, etc. should support the contract requirements. If Government requirements are flexible enough to allow the contractor to use suitable established systems, savings in cost and confusion can be realized. Levying performance management requirements on a contractor can also encourage contractors to establish suitable systems where none currently exist. This is beneficial to both the contractor and Government.

Monitoring Strategies and Techniques:

Incremental Design Reviews and Demonstrations: Probably the major contributor to software project failure is the "big-bang" approach to development where all the work is done somewhat in parallel, and come integration time everything is thrown together to see if it works. If it does (rare event) then all is well; if it doesn't then there are major problems. Theoretically, design reviews are supposed to prevent the big bang from occurring, but all to often the reviews are controlled by the contractor and present very limited visibility into the actual development process. This is particularly true in software. One way to avoid this syndrome is to require incremental demonstrations of capabilities rather than paper reviews. These must be addressed in the SOW and therefore planned for early in the development. This is an excellent way of forcing the contractor to address architectural problems early on in the development and, if the demonstration capabilities are carefully thought through, prevent the contractor from concentrating on the easy requirements first and leaving the difficult effort for later where schedule and budget are under considerably more pressure.

Metrics or Management Indicators: Considerable work has been done in establishing objective indicators which can be observed and/or computed throughout a software project to assess progress. By requiring the contractor to accumulate and report these indicators, it becomes possible to track progress using a "shorthand" method. There are different flavors of metrics, all of which have utility in software development projects. Project control metrics include such things as earned value analysis for task tracking. Quality assurance metrics assess the degree to which a pre-stated objective for a task was met. Performance metrics measure performance, usually with regard to some requirement. Again, the delivery of these metrics must be specified in the SOW.

Risk Contingency Plans and Corrective Action: When problems inevitably arise corrective action must be

RESOURCE:
The SESG publishes a *Software Management Indicators Handbook* and offers a training course in the subject.

applied. This action is concerned with bringing the status of the project into conformance with applicable requirements, budget, schedule, plans, standards, guidelines, policies, and procedures. For corrective action to be effective, good project control mechanisms must be available, and effective status and visibility techniques must be in place. Good risk management and contingency planning eases the strain of problem handling, but most PMs are not prescient, so problems will occur. If contingency plans are in existence, response to a problem is straight forward. Otherwise, there is still a continuum of actions which might be taken - do nothing, bring the project into conformance with plans and/or requirements, change plans and/or requirements to make them conform to the actual state of the project, modify both the plans and project status to achieve conformance, or cancel the project. One good solution is trading off the requirements against budget and/or schedule, if possible. All too frequently, the manager blindly increases resources to bring the schedule back within bounds; unfortunately, few software problems respond to a brute force approach.

Testing: The Government must require thorough testing of all software products. The responsibility of the GTR is to oversee preparation, by the contractor, of the test documents. He is also responsible for overseeing the testing itself, and for accepting the final product. This should be a continuing process, not left until the last months of the project. Test plans should be generated at the same time as specification and requirements documents. The key instrument for control of testing by the GTR is review of the test plans, the test cases, and the test procedures. By carefully ascertaining, at each step of the process, that all requirements are tested by the plan, then by observing the test and reviewing the test results, the GTR assures the Government will receive a quality product.

Reviews, Inspections, and Walkthroughs: There are many types of progress reviews: weekly status meetings, demos, quarterly reviews, milestone reviews, etc. The major value of a review lies in the preparation and follow-up. For a progress review to be effective, action items must be tracked by assigning a responsible party and due date, and demanding resolution. Open action items become the subject of follow-up reviews. The PM and GTR should specify an appropriate level of review activity in the SOW and contract. Inspections consist of peer review of work products, such as specifications,

plans and code. Tailored checklists are used to guide the effort. The results of the inspection are analyzed for trends and recurring types of mistakes. They are highly recommended to catch misunderstandings early-on, especially since the cost of finding and fixing a mistake at this stage of the development process is significantly less than fixing a fielded system. Walkthroughs are similar to inspections, except they are informal. The author usually presents the material, and checklists are seldom used. Their purpose is to transfer design information and interact with team members working in a similar area of the project. Walkthroughs are most effective for communicating technical issues such as requirements allocation, interface conventions, and architectural design structures among software developers.

CASE Fundamentals

CASE is a set of tools to aid the system engineer. It uses automation of sophisticated techniques and documentation types to describe both the processes and the data relationships which are required to accomplish the project requirements. These diagrams may be thought of as alternative ways to describe the requirements at a very detailed level. They may be tied back to the requirements model and are actually an evolution of it to a more concrete and detailed stage. This stage is called the "analysis phase," and is the logical model of the software project.

The next stage of CASE is the "design phase," which deals with the concrete elements of computer programming such as data tables and program flow charts. These are generated by the tool from the Module Action Diagrams and Entity Relationship Diagrams prepared in the previous phase. The engineer here works with the order of program flow, by rearranging flow chart elements, and with the data storage associations, e.g. in a relational data base, by designing the tables. When work is complete in this stage, the engineer presses the button and the code for both the program and the data element dictionary (if one is using a DBMS) are machine generated. This is called the "construction phase."

CASE offers tremendous potential by eliminating a great deal of effort and staff in the detailed design and coding phases. However, the toolset is expensive, and engineering effort is both large and highly specialized in the analysis phase.

Computer Aided System Engineering (CASE): When the contractor is using CASE technology one way of monitoring the development process in a relatively unobtrusive way is for the Government to acquire a full set of the contractor's CASE environment and require periodic delivery of the development information in the CASE format. This allows the GTR and support staff to analyze the activities, accurately evaluate the status and maintain currency with design decisions.

The Software Engineering Specialty Group

The Software Engineering Specialty Group (SESG) was established to improve the FAA acquisition, development and maintenance processes for operational software. It was intended to function as an expert resource to the Program Manager and staff, in the RFP process, the evaluation of proposals, and throughout the product lifecycle. Most importantly, the SESG is a service organization, here to help you.

The SESG has an internal operating plan that defines specific tasks to be accomplished each year. These tasks have been developed by meeting with SESG "customers" and all tasks support overall area improvement to the FAA in software engineering and management. The SESG tasks address deficiencies established in the approved SESG Mission Need Statement. For the near term, SESG will mostly be developing software guidelines and handbooks, providing training and technology transfer, providing software consultation support to projects as requested and as defined within an organizational Memorandum of Understanding.

SESG Staff and Points of Contact

- Carolyn Strano, Mgr, Eng. Specialties and CM Division, ASE-600, 202-287-8644
- Susan Gardner, Program Manager, 202-287-8646
- Bill Norton, SESG Standards & Handbooks, SESG staff planning and support, 202-287-8708
- Cecil Maccannon, Project Consultation, Training Coordinator, SESG Workshop, SESG Liaison, 202-287-8647
- Norm Simenson, Project Consultation, Software Capability Eval. Acq. Self Assessment, 202-287-8651
- Debora Sery, SESG Standards & Handbooks, SESG INTERFACE Newsletter, SESG Workshop, 202-287-8658
- Shirley Ginwright, Project Consultation, Software Eng. Forum, Software Eng. Consultation Lab, 202-287-2643
- Stuart Bell, SESG Standards & Handbooks, SESG Plans, 202-287-8715
- Patrick Brown, Software Acquisition Guidelines, 202-287-8648
- Linda Durrett, Division Secretary, 202-287-8644
- Customer Assistance Line, 202-646-4777

- ASE-600 Fax, 202-287-8761
- Rich Turner, AND Liaison, Software Acquisition Management Course, 202-267-6611
- Leo McNamara, AIT Liaison, 202-267-8627
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Point of Contact for Chapter 15 is Susan Gardner, ASE-600, 202-287-8646.

Chapter 16

Nondevelopmental Items

This chapter discusses Order 1810.6, Policy For the Use of Nondevelopmental Items (NDI) in FAA Acquisitions, November 13, 1992. This order states that the FAA shall examine the opportunities to satisfy mission requirements through the use of nondevelopmental items (NDI) or equipment that is available without further development work. Information is included in this chapter on some areas that are particularly significant when considering acquiring nondevelopmental items. While NDI must comply with the same acquisition policies (FAR, Order 1810.1, etc.), it is possible to tailor acquisition strategies to get products and services to the users more quickly and for lower costs than using the traditional development of an FAA unique item. However, we must be willing to trade off some "nice-to-have" performance parameters for extra schedule and cost benefits and consider support issues at the beginning of the process, much earlier than we do in most cases now.

Process Description

When basic user requirements are established in mission analysis and the mission need statement (MNS) is developed, mention should be made of whether NDI is a possible option for any acquisition solution. In most FAA acquisitions, this should be a viable option. If NDI is a possible option, it's feasibility must be analyzed and input to the decision on acquisition strategy. Analysis is supported by market surveillance and investigation. Market surveillance is formally defined as a continuing and ongoing effort to stay technically current in areas of agency interest or expertise. The FAA does not currently conduct a formal systematic program of market surveillance; however, recent experience, publications, and marketing information received from industry are sources of market surveillance information.

If the information available from market surveillance indicates that NDI may be a suitable solution, a more specific and detailed evaluation of suitability is conducted to support the NDI decision. This information is obtained through market investigation, defined as activity conducted before an initial milestone review decision on pursuing NDI. Market investigation provides the basis for finalizing the requirements, developing the specification, determining test requirements, and determining logistics support requirements. Methods to obtain information can include testing of samples, information from independent test

activities, and surveys. Note that the requirements documents and specifications are not completely firm until after this step, when the appropriate tradeoffs are made. This is a fundamental difference in process because it is not assumed that the system/equipment will be built in accordance with a specification. This decision is part of the acquisition plan and other documentation and is approved by the appropriate ARC or TSARC.

Lessons Learned

In the past the FAA has not normally made tradeoffs which reduce NAS-SS-1000 requirements, eliminated desired air traffic or airway facilities functionality, or described systems that were built to commercial specifications. In some cases tradeoffs were made after contract award to reduce or waive requirements that were too difficult or costly to meet.

Use of NDI in communications systems has proven beneficial to date. Programs such as high capacity voice recorders, transceivers, modems, and microwave radios have been or are in the process of being successfully acquired at relatively lower cost and in much less time that if a full development program were undertaken.

NDI support and life cycle issues must be addressed as early as possible. When NDI is used, especially COTS, the Government generally must accept the contractor's configuration management, manuals and technical data, manufacturing and quality control, and logistics support structure. Any special requirements, such as FAA specification manuals or training, part numbering, or special configuration control or handling make a big difference in cost. Commercial life cycles are also implicitly part of the NDI bargain, and are generally much shorter than the life cycles of the equipment being replaced. This must be considered in planning for life cycle support or replacement of NDI systems.

Responsibilities

Responsibilities for NDI set out in Order 1810.6 are generally the same as for any acquisition, with users responsible for generating requirements while the ARC or other decision body or individual approves the acquisition plans. Some specific areas have some particular functions that must be performed.

The program manager and management team collect market surveillance and investigation information to determine if requirements can be met with NDI. The program manager and team, along with other appropriate organizations, must agree on any tradeoffs to be made. Tradeoffs, such as performance, testing, or logistics support that are made must be reflected in documentation and should be agreed to by appropriate levels in

user, support, and acquisition organizations to assure the traded items do not creep back in as requirements at a later date.

Reference Documents

The following documents are the basis for the material in this chapter:

- FAA Order 1810.6, Policy For Use of Nondevelopmental Items (NDI) In FAA Acquisitions, November 13, 1992
- FAA Order 1810.1F, FAA Acquisition Policy, March 19, 1993
- Streamlining Defense Acquisition Laws, Report of the Acquisition Law Advisory Panel to the United States Congress, January 1993

Point of Contact for Chapter 16 is Roger Martino, ACQ-10, 202-267-8506.

Chapter 17

Procurement Quality Assurance And Industrial Evaluation

This chapter provides a reference to FAA NAS Quality Assurance Policy, to the type of quality assurance procedures and standards to be used on NAS procurements, and describes the industrial engineering activities associated with these procurements.

Process Description

The Industrial Division of the Logistics Service, ASU-400, is responsible for developing and implementing agency policy, standards, and procedures for the quality assurance programs involved in the procurement of NAS systems, equipment, and material. The Division has a headquarters staff of Industrial Engineers and Industrial Specialists, and a field staff of Industrial Specialists and Quality Assurance Specialists (QAS) located throughout the United States. When contract responsibility is assigned to a QAS he or she is then referred to as the Quality Reliability Officer (QRO).

Order 4630.8, Quality Assurance Policy, states that a Quality Assurance Program shall be provided for and included in the documentation for the acquisition of all NAS systems, equipment, and material. This order defines the responsibilities of the various organizations involved, and also states the overall objectives for having a quality assurance program.

Under the matrix management concept, the Industrial Division will designate the Associate Program Manager for Quality (APMQ). In many cases this person will also be the QRO assigned responsibility for the contract. In some cases, however, depending on the relationship and number of contracts involved in a particular program, the functions of APMQ and QRO may be performed by different personnel. As the APMQ, the person designated has the responsibility to support the Program Manager. The APMQ is the central point of contact for the Division on all QA matters. As the QRO, the person designated has the responsibility to provide on-site QRO support at the contractors' facilities under the authority delegated by the Contracting Officer. The QRO assures that the contractor adheres to contract quality assurance requirements, and is authorized to accept or reject systems, equipment, and material in accordance with the contract requirements.

The Industrial Division has implemented a program that is referred to as the "Certification Program". This program is described in FAA Order 4453.2 and Advisory Circular 00-41. The Certification Program is only invoked on major procurements when FAA-STD-016 is used. Under this program, potential contractors submit a "Quality Control System Plan (QCSP)" as part of their proposal submission. This plan is thoroughly reviewed by the Industrial Division, deficiencies are negotiated and resolved, and the final approved plan is incorporated, at contract award, into the contract. After contract award, and after the in-plant QRO has made a determination that the QCSP has been acceptably implemented, the successful contractor is presented with a certificate that attests to the approved quality control system. The philosophy behind this program, which has proved to be very successful, is that it is the contractor's responsibility to perform the QA function, and it is the Government's responsibility to verify that this function is being performed. The use of a certificate, which is usually presented to the company by a senior FAA official in a formal presentation with company personnel present, helps to bring home to the company the importance the FAA places on quality assurance, and helps serve as a motivating factor to company personnel in the performance of the contract.

Headquarters Activities

The headquarters staff of the Industrial Division provides several services, many of which occur during the "before award" phase of a procurement.

Contractor evaluations are normally performed by the Industrial Engineers. The two most common types of evaluations are Preaward Surveys and Production Capacity Evaluations. A preaward survey is usually requested by the Contracting Officer (CO), although the Program Office can request it through the CO. The purpose of this survey is to determine that the potential contractor has the necessary capabilities to satisfactorily perform the proposed contract. The normal areas investigated include Technical Capability, Production Capacity, and Quality Assurance. A representative of the Program Office or Technical Office will be requested to be part of the preaward team for the purpose of performing the "Technical" portion of the survey.

Production Capacity Evaluations are normally performed after contract award, at the request of either the CO or the Program Office, and are usually performed when difficulties arise, or it is desired to get an independent "look" at the contract status and progress.

In order to assure that the proper QA requirements are used, the Division reviews various procurement documents. These include such documents as procurement requests (PRs), specifications,

statements of work (SOWs), and solicitations. On major procurements, a representative of the Division will be a member of the Source Evaluation Board (SEB). While the primary activity of the Division representative in these functions is QA, a secondary role is to provide, when requested, Industrial/ Manufacturing Engineering input, and to act as a technical liaison between the contracts and the technical organizations.

During the proposal evaluation phase of a procurement, when FAA-STD-016 and the Certification Program is used, a member of the Division, usually the QA member of the SEB, will act as the QA review team chairperson. He or she will be responsible for reviewing the contractor submitted QCSP, negotiating any deficiencies with the contractor, and providing final approval of the plan. Additionally, this same person would also perform a similar function in reviewing/approving the Computer Software Quality Program Plan (CSQPP) submitted in response to FAA-STD-018 when this standard has been made a requirement of the contract.

After contract award, a Quality Reliability Officer (QRO) will be assigned by the Quality Assurance Branch. This is accomplished by the Contracting Officer sending two copies of the contract to the branch. Upon receipt of the contract, branch personnel will assign a QRO and provide the Contracting Officer the necessary documentation for the formal Letter of Delegation. While the QRO is assigned to the contract by the Division, his or her authority on the contract actually comes from the CO as stated in the Letter of Delegation that is sent to the contractor.

In addition to the above, the Division is also responsible for implementing the guidelines and procedures for the acquisition of reprocurement data. The subject of reprocurement data, and the FAA policy, is addressed in FAA Order 4405.15. The Division has the responsibility to review, and approve/disapprove all headquarters requirements and maintenance organizations recommendations regarding the acquisition of reprocurement data, and to maintain an index of reprocurement data received.

Field QA Activities

After contract award, a QRO will be assigned to the contract as described above. The QRO may also be the APMQ for that program, or a different person may be the APMQ depending on the relationship and number of contracts within a Program Office. The main functions of the QRO are to verify the acceptability of the contractors QA system, perform inspections and test witnessing, and to accept or reject items submitted by the contractor in accordance with the terms and conditions of the contract. If final acceptance is at destination then the QRO will perform a "preliminary" inspection and acceptance function. As the APMQ, the QRO will support the Program Office in accordance with the Program Directive, that is agreed to by the

Program Office and the Division, and be the central point of contact for the Division on all QA matters.

In addition to the in-plant QA functions, field activities also include contract administration activities such as monitoring contractors progress, evaluating and commenting on progress payment submissions, and issuing periodic QRO progress reports. A production surveillance function is also performed on major contracts by the field Industrial Specialists.

FAA Quality Standards and Their Use

Part 46 of the Federal Acquisition Regulation (FAR) specifies the type of QA requirements to be used on various procurements. Almost all FAA procurement for supplies will at least use FAR clause 52.246-2. If a procurement involves complex and/or critical requirements, then the FAR prescribes that a "higher level contract quality requirement" be used. In the FAA, there are three higher level QA requirements that are used. These are FAA-STD-013, FAA-STD-016, and FAA-STD-018. Following is a brief description of each, and the conditions for their appropriate use.

- FAA-STD-013 specifies requirements for an inspection/QC system. This standard would be used on procurements that are of an equipment or small system nature, rather than procurements that are major systems. FAA-STD-013 is essentially a "hardware" oriented standard, but it does include some software QA requirements. This standard would also be used on procurements that are for Non-Developmental Items (NDI), although some NDI procurements that are literally "commercial-off-the-shelf" (COTS) would not use this standard, but would instead just invoke FAR Clause 52.246-2.

- FAA-STD-016 specifies more requirements than FAA-STD-013, and is used on procurements that are for major systems. The use of FAA-STD-016 invokes the FAA Certification Program, which is described in FAA Order 4453.2. As specified in this order, the certification program and FAA-STD-016 would be used when the item(s) to be procured is of sufficient complexity, and the total contract expenditure is expected to be $10 million or more. FAA-STD-016 is essentially a "hardware" oriented standard, but it does include some software QA requirements.

- FAA-STD-018 specifies requirements pertaining to software QA. The use of this standard is prescribed in FAA Order 4630.9. It can be used alone, or in conjunction with either FAA-STD-013 or FAA-STD-016. This standard is used when the procurement involves a

software development period of at least one year, and the software is complex/critical requiring high reliability and maintainability.

In addition to the above standards, section E of any solicitation/contract will contain the requirements with respect to inspection and acceptance. Standard "Section E" clauses have been developed for any combination of QA standards used. It is in this section of the contract that the FAR clause or higher level quality requirements is specified. This section of the contract will also contain references to the QRO and his/her duties. In a solicitation, when FAA-STD-016 or FAA-STD-018 is specified, the requirements with respect to the QCSP or CSQPP will be given in section L of the RFP along with the other proposal requirements.

Lessons Learned

Significant problems occur when an incorrect QA standard is used, or when no QA standard is specified. Use of an incorrect standard can cause unnecessary costs to be incurred by the contractor and the Government, and the lack of a QA standard can lead to poor quality and its' associated costs. It is important that the Program Office coordinate with ASU-400, early in the programs development, as to the correct standard(s) to be used.

A procurement for NDI or COTS does not automatically mean that no "higher level" QA standard is needed. Any NDI or COTS procurement should be coordinated with ASU-400 as to the appropriate type of QA standard to be used.

While the APMQ is a member of the Program Management team, it must be realized that he or she, when acting also as the QRO, is legally bound to perform his or her duties, and to accept or reject contract items in accordance with contract requirements. Any deviation or waiver to the contract requirements that the Program Office plans to approve, must be formally incorporated into the contract before the QRO can accept the item.

Responsibilities

The Program Manager is responsible for including appropriate Quality Assurance provisions in all contract documents as stated in FAA Order 4630.8, Quality Assurance Policy.

The Industrial Division is responsible for providing and assigning the necessary APMQ/QRO and other support to the Program Office, as required.

Contacts

The following groups can be contacted for additional information in the areas indicated:

- Contractor Evaluations, and any "before award" activities, ASU-410, 202-267-8270
- APMQ/QRO assignments, and any "after award" activities, ASU-420, 202-267-8908
- Copies of/Information regarding FAA QA Standards and Reprocurement Data, ASU-430, 202-267-8270

Reference Documents

The following documents are the basis for the guidelines presented:

- FAA Order 4630.8, Quality Assurance Policy
- FAA Order 4453.1A, Quality Assurance of Material Procured by the FAA
- FAA Order 4453.2B, FAA Quality Control System Certification Program
- FAA Order 4630.9A, FAA Computer Software Quality Program Requirements
- FAA Order 4405.15, Reprocurement Data Acquisition Policy
- FAA-STD-013, Quality Control Program Requirements
- FAA-STD-016A, Quality Control System Requirements
- FAA-STD-018, Computer Software Quality Program Requirements
- Federal Acquisition Regulation, Part 46, Quality Assurance
- Advisory Circular 00-41, FAA Quality Control System Certification Program
- Advisory Circular 00-53, FAA Computer Software Quality Program

Point of Contact for Chapter 17 is Paul Przedpelski, ASU-400, 202-267-8904.

Chapter 18

Production Engineering Management

This chapter provides a quick reference for Production Engineering Management (PEM) in the National Airspace System.

Process Description

PEM is the process used to ensure that effective resources and design techniques are being used to produce the required products in a timely manner in order to meet the specified requirements for performance, quality and cost. Early detection and rapid reporting of existing and potential production problems is essential to program success. Some of the areas to be investigated specific to PEM are capacity resource analysis, producibility analysis, production planning, production engineering, tooling, equipment, manufacturing processes and program specification adherence.

Production is a system of interrelated activities and operations involving the design, materials selection, planning manufacture, quality assurance, and management of discrete and durable goods. The world of production is far different from that of prototype or development. It deals with the mass producing of products on hard tooling; whereas engineering development deals with very small quantities generally produced on soft tooling in a laboratory environment utilizing high-priced labor categories (i.e., engineers and skilled technicians). Articles that can be satisfactorily developed and tested in laboratory conditions, on what is often handmade tooling and test fixtures, do not lend themselves to mass production processes. These changed processes often introduced changes in the operating characteristics of the article or created the potential that the article in fact cannot be mass produced. These problems will lead to significant rework and additional testing which will impact schedule and cost.

The transition between the development and production phases, and the implementation of proven production techniques on the manufacturing floor is critical to program success. An engineering change introduced during the development phase generally will have little impact on system schedule and cost. During production, however, that same change could devastate the program since its impact will affect so many different areas. Effective production management is a valuable asset to the FAA in evaluating the producibility of the design and impact of design

changes in both the development and production phases of an acquisition.

Transition from the development to the production phase and success in the ensuing production operations require the implementation of sound techniques and practices on the factory floor. Recent Government studies reflect that 90 percent of modern electronic system failures were determined to be production-related.

Significant causes cited for this include the following:

- Engineering changes not implemented into production documentation
- Improper tooling
- Excessive hardware rework and repairs degrading the quality of the equipment
- Factory floor capacity exceeded in an attempt to regain the program schedule
- Engineering documentation not understood at the factory level
- Lack of early production involvement in the transition process
- Improper or inadequate level of staffing
- Poorly trained production personnel
- Key personnel not available with the required skills
- Key personnel being transferred among different programs without adequate replacement
- Factory floor not working to detailed milestones developed to achieve overall project objectives

Problems of this nature can be detected and reported, and solutions recommended to the FAA program office through the utilization of the PEM function. Onsite surveillance of a contractor's production and manufacturing operations is an excellent means of detecting variances from production plans and system schedules, and from the use of proven, effective manufacturing processes.

The PEM function has the following goals:

- To enhance the manufacturing management process
- To improve system effectiveness
- To ensure product quality

Enhance the Manufacturing Management Process

Effective PEM can enhance both productivity and manufacturing management through a comprehensive surveillance of the following contractor tasks: production and manufacturing strategies and processes; use of state-of-the-art, proven technologies; use of the engineering discipline; daily management of engineering/ design change notices; and implementation, on the shop floor, of the principles of total quality control management.

Improve System Effectiveness

Problems involving production and manufacturing areas will negatively impact both program cost and schedule at a time in the product life cycle when all schedule and cost slack has usually been consumed by the design and system development phases. Problems at this phase of a program almost always represent a direct probable delay in product delivery.

Some of these production areas include the following:

- Production control
- Manufacturing processes and methodology
- Material control and handling
- Facilities layout
- Capacity (especially when other programs become the contractor's priority)
- Use of special test equipment, tooling, fixtures and/or jigs that will be a challenge to reproduce in the field
- Random parts substitution
- Ineffective management of essential labor skills
- Movement of key personnel to react to other contract problems

Ensure Product Quality

The quality of a product tends to diminish and a well-engineered system goes on a self-destructive course in production phase of a program when the following occurs:

- Less than needed skill is used
- Testing is intentionally reduced to recover schedule
- Substandard parts are used as substitutes to take advantage of better lead times and to lower the manufacturer's costs
- Tools are used beyond their projected useful life
- Personnel is not rotated and get complacent and careless doing the same operation over and over
- Poor rework procedures are used
- Organizational stress is felt on the shop floor

Effective PEM will aid the FAA by not letting these areas of concern go unnoticed. PEM will track key milestones, take key productivity measurements and monitor the contractor's use of proven manufacturing/production techniques (back-up tooling, tool calibration, cross-training, job rotation, use of a skilled assembler for rework operations, etc.) to help ensure the FAA that a quality product is being produced each and every time.

It must be clearly understood that PEM and the QRO have separate and distinct functions.

The PEM, composed of System Engineering and Integration Contractor personnel, initiates its activities early in the acquisition life-cycle process and continues its support throughout the Request for Proposal (RFP), evaluation and acquisition, and production and testing phases. PEM monitors and verifies that the FAA contractors, during both the proposal evaluation and contract award phases, are complying with all the production-related requirements of the RFP and contract. PEM also monitors each critical component of the contractor's production plan, thereby allowing early identification of potential problems, and it provides a reasonable timeframe for implementing proposed solutions. This effort will mitigate any negative effect on quality, cost, and schedule.

The QRO, a Government employee, provides onsite monitoring of the contractor's day-to-day activities to ensure compliance with applicable quality standards and contract requirements. The QRO is also responsible for accepting the final product from the

contractor. These functions are normally conducted after the contract has been awarded.

The PEM and the QRO interface during the transition from development to production. At this point the PEM assesses the risk of the transition, identifies deficiencies, and recommends corrective actions. The QRO works with the contractor to develop and implement corrective action.

Contacts

The following division can be contacted for additional information on production engineering management:

- SEI contractor Production Engineering Management Group, 202-646-5358

Reference Documents

The following documents are the basis for the guidelines presented:

- Air Force Systems Command Regulation 84-2, Production Readiness Review
- DOD-DIR-4245.6, Defense Production Management
- DOD-DIR-5000.1, Major Systems Acquisitions
- DOD-DIR-5000.39, Acquisition and Management of Integrated Logistics Support for Systems and Equipment
- DOD-DIR-5010.19, DOD Configuration Management Program
- DOD-INST-5000.2M, Major Systems Acquisition Procedures
- DOD-INST-5000.38, Production Readiness Reviews
- DOD-INST-7000.2, Performance Measurement for Selected Acquisitions
- DOD-INST-7000.10, Contract Cost Performance, Funds Status and Cost/Schedule Status Reports
- DOD-STD-480A, Configuration Control
- DOD-STD-481A, Configuration Control Engineering Changes
- DOD-STD-1686, Electrostatic Discharge Control Program
- FAA-G-2100F, Electronic Equipment, General Requirements

- FAA-STD-016A, Quality Control System Requirements
- FAA-STD-021A, Configuration Management
- MIL-STD-965A, Parts Control Program
- MIL-STD-1521B, Technical Reviews and Audits for Systems, Equipment, and Computer Programs
- MIL-STD-2000, Standard Requirements for Soldered Electrical and Electronic Assemblies

Point of Contact for Chapter 18 is Paul Przedpelski, ASU-400, 202-267-8904.

Chapter 19

Deployment Readiness Review

This chapter describes the operation of the Deployment Readiness Review (DRR).

DRR Process Description

The DRR process is a structured assessment of the subsystems/ equipment acquired under the Aviation System CIP, and selected R&D, regional or headquarters Operations funded projects. This is done to determine if they are ready to be deployed into the National Airspace System (NAS), and whether the FAA is ready to receive, utilize, and support them.

The process utilizes a team of experts to develop a DRR checklist which addresses the concerns of the program office, ABU, ALR, AAT, ACT, AHR, AMC, ALM, ANS, AOP, regions, etc., and is updated periodically. It should start about 16 months prior to delivery to the T&E site to fully realize its value.

This structured assessment is a management tool used to identify, track, monitor, and control the critical and noncritical items until completion. The critical items must be resolved prior to deployment; the noncritical items need firm action plans in place with completion dates, before a deployment decision is rendered.

Lessons Learned

Use the DRR process and checklist early in the acquisition process. This avoids problems later on and makes it easier to prepare the PR and solicitation packages. It also expedites the deployment process.

Start the DRR process early in the development cycle so that all members of the team are on track and working the issues that have to be solved.

Resolve critical DRR items as soon as possible to avoid problems at the start of deployment.

Using the DRR checklist in the procurement planning phase will ensure that deployment considerations are addressed in the program.

Responsibilities

The major responsibility of the PM in the DRR process is to conform to, and apply the provisions of Order 1800.63, NAS Deployment Readiness Review (DRR) Program, in the following ways:

- Ensure that the DRR checklist is used for a variety of pre-DRR events as part of the responsibilities, authority and accountability for a system acquisition

- Initiate, conduct, and complete a thorough and objective project DRR including fulfilling DRR team leader responsibilities

- Establish and maintain currency of the Master Scheduling System (MSS) milestones that are key to scheduling events governing the DRR process

- Ensure prompt closure of the DRR checklist open items assigned to the project office in accordance with action plans and established closure dates

- Conduct a project review and report the results, citing all remaining deployment critical and non-deployment critical issues in a DRR Report to the Associate Administrator for Airway Facilities

The Airway Facilities DRR Program Manager, ALM-200A (Guy Hawkes), is responsible for the following:

- Manage the DRR program as defined in Order 1800.63

- Serve as an expert resource on the DRR process and support the Program Manager in meeting his/her DRR responsibilities

- Manage DRR support functions, thereby ensuring timeliness of DRR events such as reports, integrity of project reviews, establishment and update of project checklists, data bases, clearance of issues, final closure of projects, etc.

- Advise the Associate Administrator for Airway Facilities on DRR program matters

The DRR Team Members are responsible for the following:

- Perform an objective assessment of project deployment readiness as defined in Order 1800.63
- Provide assistance to the PM as part of their organization's functional responsibility, by speaking for all elements involved in the project
- Serve as expert resource to the team to aid in the identification of issues and appropriate action office(s) for resolution
- Review the annotated project DRR checklist to ensure completeness and accuracy of all identified issues, and ensure that all identified action plans support closure
- Facilitate closure of issues within the purview of their parent organization
- Review the DRR Report to ensure it states the identified concerns correctly
- Prepare the parent organization's representative for participation in the DRR Executive Committee (EXCOM) for that project

DRR Focal Points

DRR focal points are designated by the parent organizations (AMC, ACT, regions, AVN, etc.) to serve as ongoing liaison with DRR program management for all activities, and their responsibilities include the following:

- Manage DRR activities within their parent organization
- Provide liaison between the organization and the DRR program management
- Support their organization's representative to the DRR EXCOM

The DRR Executive Committee

The DRR EXCOM is comprised of executive-level FAA and support contractor personnel. Their responsibility is to review the DRR Report and provide advice and counsel to the Chairman (the Associate Administrator of Airway Facilities) who makes the deployment decision for each individual project.

Contacts

The DRR Program Manager can be contacted for additional information on the DRR process:

- Guy Hawkes, ALM-200A, 202-267-7489, 202-267-5632 (fax)

Reference Documents

The following documents are the basis for the guidelines presented:

- Order 1800.63, National Airspace System (NAS) Deployment Readiness Review (DRR) Program

- DRR checklists are available from ALM-200A, the DRR Support Contractor - NISC, and the DRR Electronic Bulletin Board System (EBBS)

Point of Contact for Chapter 19 is Guy Hawkes, ALM-200A, 202-267-7489.

Chapter 20

Labor Relations

This chapter presents information regarding the agency's statutory and contractual obligations to deal with employees who are represented by labor organizations.

Process Description

Although system capacity and safety are the primary concerns in acquiring major systems, PMs must also consider the employees who will operate and maintain these new systems. The majority of employees who operate and maintain the air traffic system are covered by five national unions. Any employee input must be obtained from these exclusive representatives:

- The National Air Traffic Controllers Association (NATCA) represents all GS-2152 air traffic control specialists located at terminal and enroute facilities
- The Professional Airways Systems Specialists - Airway Facilities Unit (PASS/AF) represents the employees of the Regional Airway Facilities Divisions
- The Professional Airways Systems Specialists - Flight Standards Unit (PASS/FS) represents Flight Standards employees world-wide
- The National Association of Air Traffic Specialists (NAATS) represents air traffic control specialists at flight service stations
- The National Association of Government Employees (NAGE) represents air traffic assistants

The agency has negotiated national agreements with four unions: NATCA, PASS/AF, PASS/FS, and NAATS. A contract has not yet been negotiated with NAGE.

The Administrator has delegated to the Office of Labor and Employee Relations (ALR) the responsibility: to deal with the national labor organizations, to negotiate and administer the national agreements, to negotiate and approve mid-term agreements, and to conduct daily labor-management relations contacts on behalf of FAA management. Centralization of labor relations activities ensures consistent interpretation and

application of law, rules, regulations, agency policy and national agreements.

Determining Impact on Bargaining Unit Employees

To ensure that PMs and the appropriate management officials have an awareness of the effect of their decisions in acquiring new systems, ALR-100 has instituted a process which is included as an issue item on the Deployment Readiness Review (DRR) Checklist for each system.

This process requires that the PM contact the relevant headquarters management office (AFZ-300, ATZ-2, or AFS-6) to determine the impact of a particular system on bargaining unit employees. The first issue review will alert management to impact issues in the areas of contractor maintenance, training, certification, etc., before they are finalized, and to what extent they could affect staffing and employee grades. A copy of the checklist used to determine impact on employees is included as Figure 20.1. This early review will focus PMs and the operating management officials on potential problems that could arise in the labor/management area and prevent unforseen delays in deployment.

The second requirement is that as the time for deployment approaches, any impact on the bargaining unit employees must be communicated to the national unions in order that they may decide whether or not to invoke negotiations. The time frames for notification vary for each union. For example, the NATCA agreement requires notification and involvement in work groups, 30-day notification prior to field evaluation and OT&E, and notification and bargaining prior to the Deployment Readiness Review Executive Committee Meeting (EXCOM).

Obtaining Input from Unionized Employees

Under the Federal Labor Management Relations Statute, the agency must negotiate any adverse impact on bargaining unit employees prior to implementing changes to personnel policies, practices, or other conditions of employment. To bypass the union and deal directly with the employees constitutes an unfair labor practice.

PMs may require employee input on the development and implementation of a system through various means, such as work groups, surveys, site visits, and testing and simulation of equipment. Bargaining unit employees participation in these endeavors must be coordinated with ALR-100, ATZ-2, AFZ-300, or AFS-6 at Headquarters. The PM shall give ALR-100 an advance copy of any survey instrument for solicitation of bargaining unit employee input. The PM shall also identify the desired qualifications of the employees participating in workgroups such as the experience level required, the dates of involvement,

travel requirements, etc. In the case of NATCA, once this is done, ALR-100 will communicate these requirements to the union and obtain a designated representative of the Union to participate in the work group. Sufficient lead time should be allowed in requesting union designees to reorganize their work schedules to avoid overtime costs.

Negotiating Before Deploying Systems

The DRR Checklist requires that PMs provide 90-day advance notification of deployment to ALR-100 to ensure that the agency meets its bargaining obligations with the unions in accordance with existing contract provisions. The PM should work with the Project's focal points in Air Traffic, Airway Facilities, and Flight Standards to determine the impact of the particular NAS system on bargaining unit employees. At least 90 days before the EXCOM, the PM should submit an executive summary and checklist using the outline in Figures 20.1 and 20.2 as a guide.

Upon receipt of any bargaining proposals, ALR-100 will notify the appropriate PM, through the labor relations points of contact in Air Traffic, Airway Facilities, and/or Flight Standards. Negotiations are normally limited to the impact technological or procedural changes will have on bargaining unit employees. There is no obligation to bargain on the specifications of the system or on management's decision to proceed with the deployment.

Even though a project may have received a waiver or exception from the DRR process, the obligation to inform and negotiate with the unions will still apply.

Responsibilities

The Administrator has delegated to the Director of Labor and Employee Relations, ALR-1, the approval of collective bargaining agreements on the impact and implementation of NAS systems.

The Director of Labor and Employee Relations administers the overall labor-management relations program in FAA which includes the following:

- Ensuring that the labor organizations' views on agency personnel, policies, and practices affecting working conditions, when appropriate or required, are solicited and made available to agency management officials

- Representing the agency in discussions and negotiations with national officials of labor organizations

The PM is responsible for providing the necessary information to the Director of Labor and Employee Relations in a timely manner so that the Director can notify the national unions before NAS

systems are deployed. The PM is also responsible for informing ALR-1 before conducting surveys of bargaining unit employees and in soliciting employees for tests, demonstrations, and development of systems or subsystems.

Contacts

The following branch or divisions can be contacted for additional information in the areas indicated:

- Airway Facilities (PASS/AF), AFZ-300, 202-267-7976
- Air Traffic (NATCA), ATZ-2, 202-267-3022
- Air Traffic (NAATS), ATZ-2, 202-267-3022
- Flight Standards (PASS/FS), AFS-6, 202-267-3928
- Office of Labor and Employee Relations, ALR-100, 202-267-3409

Reference Documents

The following documents are the basis for the guidelines presented:

- Federal Service Labor-Management Relations Statute, 5 U.S.C. Chapter 71
- 1993 NATCA/FAA negotiated agreement, Articles 7 and 48
- 1992 PASS(AF)/FAA negotiated agreement, Articles 69 and 70
- 1993 NAATS/FAA negotiated agreement, Article 9
- 1993 PASS(FS)/FAA negotiated agreement, Articles 68 and 69
- FAA Order 3710.7C, Labor Management Relations Program
- FAA Order 1100.2C, Organization - FAA Headquarters

Point of Contact for Chapter 20 is Susanna Leon-Guerrero, ALR-100, 202-267-3409.

QUESTIONS CONCERNING IMPACT OF NEW TECHNOLOGY TO ASSIST IN DETERMINING WHETHER OR NOT THERE IS IMPACT ON BARGAINING UNIT EMPLOYEES

NOTE: Any affirmative responses to this checklist must be fully explained in the executive summary, Figure 20.2.

Does implementation of the new system affect the following:

a. Grades of employees?

b. Number of employees?

c. Change in method of performing work?

1. Require or eliminate logs or other records?
2. Require use of new tools/procedures/techniques/equipment?
3. Require use of new materials, solvents, lasers, etc.?
4. Work more arduous or demanding?
5. Work to be done in teams, rather than individually?
6. Require change in computer/human interface?

d. Require additional training or qualifications, i.e., Academy, OJT, directed study, etc.?

1. Acquire new skills?
2. Require new methods of operation?

e. Certification of employees? Air Traffic _____
Airway Facilities _____

f. Organizational reassignment to another unit, facility, group, team?

g. Affect the work location of employees? City, remote location, etc.

h. Affect travel issues?

1. Extend or decrease commuting time of employee?
2. Require change in travel to perform work?
3. Change travel method of performing work, i.e., Government car vs. POV?

FIGURE 20.1

QUESTIONS CONCERNING IMPACT OF NEW TECHNOLOGY TO ASSIST IN DETERMINING WHETHER OR NOT THERE IS IMPACT ON BARGAINING UNIT EMPLOYEES (CONTINUED)

i. Affect employee's evaluation of performance?

   1. Elements and Standards change?
   2. Rate changed?

j. Affect overtime or other pay issues?

   1. Increase/decrease in overtime?
   2. Increase/decrease in night differential?
   3. Require call-back?
   4. Environmental pay affected?

k. Require changed medical requirements?

l. Require change in working hours?

   1. Four 10-hour days?
   2. Shift work?
   3. Short turn-arounds?
   4. Change in break times or duration?
   5. Watch schedule changes?

m. Change in physical working environment?

   1. Different building?
   2. Ventilation, window, dust, adequate CBI training facility?
   3. Adequate parking?
   4. Handicapped access?
   5. Modification/construction in employee work area?
   6. Access to medical facilities?
   7. Access to child care facilities?
   8. Exposure to hazardous materials?

n. Require change in security clearance?

o. Any other aspect of system deployment which impacts on bargaining unit employees.

FIGURE 20.1

INFORMATION NECESSARY TO NOTIFY NATIONAL UNIONS OF NAS DEPLOYMENT

The following information is to be used as a guide by the PM in developing an executive summary. These issues should be addressed and combined into executive summary format prior to submittal to ALR-100.

Name of project:

Description of project: (Including project functions)

Impact on air traffic tower/center controllers:

(If unsure as to what constitutes impact, use the attached checklist to identify sources of impact and explain how this system will impact bargaining unit employees)

Impact on air traffic assistants:

Impact on airway facilities personnel:

Impact on flight service station personnel:

Impact on flight standards personnel:

Date of delivery to the field:

Date of deployment:

Deployment sites:

Date, duration and location of testing, if any:

Training necessary:

- o for air traffic personnel
- o for airway facilities personnel
- o for flight standards personnel

Maintenance concept:

Human factors: (have human factors been addressed, and if so, to what extent)

Any other information that may be appropriate:

FIGURE 20.2

Chapter 21

Program Reviews

This chapter describes the following program reviews: the Program Director Status Review (PDSR), the Detailed Financial Review, and the Major Acquisition Review. Each review will be presented separately within the chapter.

Process Description of the PDSR

The purpose of the PDSR meeting is to provide a forum for PMs to present overall program status to the Program Director, focusing on the significant issues and items which may impact program activities and schedule. The meeting is conducted at least quarterly. Those who are involved in program activities and can contribute to the program briefings are invited to attend; generally, this will include the following persons:

- Program Director and counterparts from System Engineering and Technical Assistance (SETA) and the System Engineering and Integration (SEI) Contractor
- Division Manager
- Associate Program Manager - Engineering
- Program Manager
- Business Manager
- SETA/SEI planners
- Matrix management team to include representatives from ATR, ACN, AAF, ANS, ASM, AOS, APM, ASU, AGC, ASE, AND, ACQ, SEI, and program staff

Contents of the package to be briefed at the review include the following:

- Project Performance Sheet which addresses accomplishments, delinquencies, near-term activities, concerns/issues, and action plans
- Summary Milestone Schedule which includes the status of all applicable Level I milestones

- Status of action items assigned in previous PDSR meetings

PMs will conduct a meeting with the appropriate personnel to prepare the package to be presented at the PDSR meetings. Figure 21.1 presents the specific guidelines for developing the Project Performance Sheet. Once this preparation meeting is completed, the SEI planner is responsible for providing the following to the PM for signature:

- Action items updated to reflect current status
- Final Project Performance Sheets
- Summary Milestone Schedules

Once these items are approved by the PM, the package is reproduced and distributed to those who attend the PDSR meeting. When the PDSR meeting is completed, action items assigned during the meetings are incorporated into the package by the SEI planner prior to final distribution. Final distribution is determined by the Program Director. The SEI distributes the final package.

Lessons Learned

The PDSR provides a disciplined approach to monitoring progress towards CIP objectives and also provides a forum to discuss cross-organizational issues and action plans. It is critical that PMs engage themselves routinely in managing the programs, and elevate issues as appropriate to the Program Director when they occur.

Responsibilities

The PM is responsible for preparing, coordinating, and approving the package to be briefed at the PDSR meeting. The SEI supports the effort to consolidate and distribute the package.

Contacts

The following branch and group may be contacted for additional information on the areas indicated:

- General Information, AND-10, 202-267-9026
- Milestone Schedule Data, SEI, 202-646-5729

Process Description for the Detailed Financial Review

The Detailed Financial Review is a meeting conducted to provide an informal forum for the PM to present the financial status of the program to the Program Director in a consistent, disciplined fashion. The meeting is chaired by the Program Director and focuses on significant issues and concerns at his level.

Attendance at this meeting should include the Program Director, the PM, the Deputy PM, the Program's Business Manager, the APME, AND-10, APM-100, and SEI counterparts.

Elements of the Detailed Financial Review package include the following:

- Director-level obligation trends
- Program manager-level obligation trends
- Project funding summary
- Total project requirements
- Project detailed obligation plans
- Regional obligation summaries

All packages are approved and signed by the PM prior to release to the SEI for further processing. Only one distribution of approved packages is made. This will be done prior to the start of the meeting and will be limited to the attendees.

Lessons Learned

A key benefit of the Detailed Financial Review process is the discipline it instills in the financial management process. Detailed financial planning to identify when requirements need to be funded is an absolute necessity in this process. PM and Business Managers must continuously monitor obligations and adjust their plans on a real-time basis. Accuracy of Financial Management System data is paramount.

Responsibilities

The Business Manager will work with the PM and SEI Financial Analyst to update advance procurement, obligation, and funding plans. The SEI prepares a draft package based on Program Manager/Program Business Manager direction and on data from the Financial Management System. SEI will hold a preliminary meeting with the PM and the Business Manager to review the package. The PM signs and approves the package for final presentation to the

Program Director. He may delegate signature authority to his deputy or Business Manager.

Review and Approval

Detailed Financial Reviews are conducted by the PM and the Business Manager; however, final approval is given by the PM. This is sometimes delegated to his deputy.

Contacts

The following groups can be contacted for additional information in the areas indicated:

- General Information, AND-10 (202-267-9026), APM-140 (202-287-8673)
- Financial Data, SEI (202-646-5729)

Reference Documents

The NAS Development Standard Operating Procedure (SOP) for Detailed Financial Reviews, February 1993, provides procedural guidance for this review. In addition, required data and information used in the process are also included in the following:

- Annual Procurement Plan
- Advance Acquisition Plans
- Financial Management System
- FAA Capital Investment Planning Process for FY 1996, September 1993

Process Description for Major Acquisition Reviews

Major Acquisition Reviews (MARs) are conducted periodically in accordance with TAM Chapter 34, Appendix A and Order 1810.1F. These reviews are attended by senior managers from the FAA and the OST. The intent is to provide decision authorities with sufficient information on the status of major acquisition programs so they can make informed decisions on whether the program should proceed as planned or be modified. Program review schedules are published by the Office of Acquisition Policy and Oversight (ACQ-1). ACQ-1 also establishes and distributes the presentation format and content to be used at MARs. There is one format for Research and Development programs that applies up to and including KDP III, and a second format for programs in full-scale development, production, or deployment.

The following areas are addressed at MARs for R&D programs (pre KDP III):

- Composition and status of the program management team
- Description of mission need the program is intended to fulfill
- Planned interfaces with other NAS systems
- Potential alternative solutions being, or to be, investigated for meeting mission need
- Overall program acquisition strategy for fielding a capability that will satisfy mission need
- Acquisition activity now ongoing within context of the overall acquisition strategy
- Overall program schedule and near-term activities planned for next year
- Overall program R&D and F&E funding requirements and shortfalls
- Status of key planning documents
- Achievements since the last MAR
- Unresolved problems, concerns, and issues and a plan of action for each

The following areas are addressed at MARs for F&E programs (post KDP III):

- Composition and status of the program management team
- Program summary describing the mission need, major capabilities to be provided, and baseline and current cost estimates
- Achievements, changes, and action items since the last review
- Major acquisition approval conditions
- Total program schedule and planned near-term activities over the next 12 months
- Status of major planning documents and the NAILS support strategy
- Hardware and software performance matrices
- Status of site preparation and interfaces with other NAS systems
- Funding requirements, distribution, and changes
- Status of the program obligation plan
- Cost and schedule status of the prime contract(s)
- Major technical, cost, and schedule concerns that remain unresolved
- Program risk assessment related to performance, cost, and schedule
- Issues or approval actions needing top-level FAA management attention

The MAR provides a forum for the PM to justify requests for additional funding, air concerns, and advise the review authority of issues requiring action. ACQ-1 independently assesses each program for the Administrator and identifies factors that could lead to schedule slips, cost growth, or other technical or support problems. ACQ-1 also tracks the resolution of action items that occur at each review.

Lessons Learned

Full and open discussion of program concerns and issues at MARs is an opportunity for obtaining management support and activity towards their resolution. It enables top-level managers to focus attention and resources on problems before they get out of hand, and it also protects PMs from having to solve problems beyond their means and authority.

Discussing every data entry on each MAR briefing chart can be tedious, boring, and counterproductive. The MAR briefing format is intended to serve both as a permanent record of program status and as a vehicle for addressing important issues and concerns to top management. When preparing the MAR briefing charts, PMs should provide all the information asked for in the briefing instructions. But when presenting the material at the MAR review, PMs should focus on important topics of concern and leave the review of program details to members of the audience.

Responsibilities

The PM is responsible for preparing and presenting program status at each MAR in compliance with the MAR briefing format. ACQ-1 is responsible for developing MAR review schedules, maintaining and disseminating the MAR format, independently assessing each program, and providing findings to the PM and upper FAA management, tracking the completion of action items.

Contacts

The following organizations may be contacted for additional information:

- MAR briefing format, ACQ-1, 202-267-7601
- MAR briefing schedule, ACQ-1, 202-267-8934

Point of Contact for Chapter 21 is Chuck Whelan, SEIC, 202-646-5729.

GUIDELINES FOR DEVELOPING THE PDSR PROJECT PERFORMANCE SHEET

General

Information and schedules presented to the Program Director should be coordinated with all affected organizations; the PM is responsible for notifying the Program Director of areas of disagreement.

Accomplishments

PMs should focus on significant accomplishments. Suggestions would include completed Levels I or II milestones, items from the previous PDSR near-term activities, or any other significant accomplishments. The timeframe to be considered will be from the last PDSR meeting status date to the current PDSR status date, usually two months.

Delinquencies

Generally, any item which was listed as a near-term activity in the previous PDSR package and was not accomplished should be listed as a delinquent item. Also, significant contractor activities which have not been completed per the contract schedule should be listed.

Near-Term Activities

The PM should focus on significant activities. Suggestions would include Level I or II milestones or significant contractor activity. The timeframe to be considered will be the next 60 days beyond the current PDSR status date.

Concerns and Issues

PMs should address not only those concerns and issues which are currently impacting the program, but also those which may significantly impact the program in the future. Concerns would include items which should be highlighted to the Program Director but are being worked by the PM; issues would require Program Director assistance for resolution. Any significant concerns and issues pertaining to the following major areas should be listed:

FIGURE 21.1

GUIDELINES FOR DEVELOPING THE PDSR PROJECT PERFORMANCE SHEET (CONT.)

- Procurement and contract activities (PRR, PR, RFP, contract, contract modifications)
- Design, development evaluation and progress (including design reviews)
- Technical evaluation and progress
- National Airspace Integrated Logistics Support (NAILS)
- Configuration management (Functional Configuration Audit and Physical Configuration Audit)
- Testing, evaluation and progress (contractor, T&E, regional)
- Deployment Readiness Review (refer to DRR checklist)
- Implementation (delivery, installation/acceptance, ORD)
- Interdependencies (your project is dependent on another project or another project is dependent on yours)
- Overall schedule and cost concerns
- Overall contractor performance
- Audit (GAO, IG, AXQ)
- Significant field contact and activities (e.g., field team writing a Project Implementation Plan or developing test plans)

Descriptions of concerns and issues should be brief and concise, yet should provide the necessary information. For example, "CONTRACTOR WILL NOT MEET CONTRACT SCHEDULE" is brief and does not provide specifics. "CONTRACTOR FACTORY TESTING WILL BE DELAYED 2 MONTHS BEYOND CONTRACT SCHEDULE DUE TO SUBCONTRACTOR'S INABILITY TO SUCCESSFULLY TEST AND DELIVER INTERFACE CARDS" is brief but provides a much clearer description of the issue. Descriptions should generally describe who, what, when, and why.

FIGURE 21.1

GUIDELINES FOR DEVELOPING THE PDSR PROJECT PERFORMANCE SHEET (CONT.)

Each concern or issue will be immediately followed by a description of the action plan rather than grouping all of the concerns and issues followed by a group of action plans. Note that the standard format will not require a separate NAILS section; any concerns or issues in this area should be listed under the "CONCERNS/ISSUES" section.

Action Plan

Each concern or issue must have a corresponding action plan. Action plan descriptions should be brief and succinct while providing significant information. The writeup should provide a summary of the following: what the action plan is; who has primary responsibility for implementing the plan; and the completion date.

FIGURE 21.1

Chapter 22

Agency Procurement Requests

This chapter is based on information in the "Guide to the Preparation of Agency Procurement Requests", February 1994. For more complete information, consult with AIT-200 or review the Guide itself.

Introduction

The Administrator of the General Services Administration (GSA) has the exclusive authority within the Federal Government to procure and manage Federal Information Processing (FIP) resources, including telecommunications, software, and services. When an agency needs to conduct an acquisition for FIP resources, they must have sufficient procurement authority before issuing a solicitation. For smaller acquisitions, GSA has granted automatic authority, called a regulatory blanket delegation, to federal agencies, such as the Office of the Secretary for Transportation (OST). OST has, in turn, redelegated limited procurement authority to the Federal Aviation Administration (FAA). Figure 22.1 summarizes the procurement authority thresholds and identifies who has what authority. In all cases where a proposed procurement will exceed the FAA delegation, the program office must prepare an Agency Procurement Request (APR) to obtain a specific Delegation of Procurement Authority (DPA) before proceeding with the procurement.

Frequent reference is made to the Federal Information Resources Management Regulation (FIRMR), which is promulgated by GSA as part of the Code of Federal Regulations. The FIRMR codifies government policy and procedures for all aspects of managing Information Resources Management (IRM). Reference copies of the FIRMR should be available in the program office, the Office of Information Technology (AIT), and the Office of Contracting and Quality Assurance (ASU) representatives. (Copies can be ordered from the Government Printing Office).

The problem areas associated with APRs are usually ones of omission and clarity, where required documentation is missing or is not clearly presented. The APR should be specific, clear, and not unnecessarily technical, and should contain sufficient information to explain fully to the reader what the writer intends.

For reasons of economy and efficiency, GSA directs each agency to select a Designated Senior Official (DSO) to be responsible for the acquisition and management of FIP resources. The DSO for the Department of Transportation is the Assistant Secretary of Administration (M-1). The DSO for the FAA is the Assistant Administrator for Information Technology (AIT-1). Requests for DPAs are made and DPAs are granted through the DSO channels. Under the direction of the DSO, FAA is allowed to contract for FIP resources:

- o In accordance with the FAA blanket DPA (OST Order 1350.2 and FAA Order 1370.52C)
- o When a specific delegation of procurement authority has been provided by OST in accordance with the agency/OST regulatory delegation provisions (201-20.305-1)
- o When a specific agency delegation has been provided by GSA (201-20.305-2)
- o When a specific acquisition delegation has been provided by GSA (210-20.305-3)

In the FIRMR, GSA has divided FIP resources into "types", and assigned a dollar threshold for each, above which agencies must obtain GSA approval (DPA) before beginning the contracting process.

The different FIP types are:

- o FIP Equipment
- o FIP Software
- o FIP Support Services
- o Other FIP Services

Purpose: The Agency Procurement Request (APR) is the vehicle for obtaining procurement authority so that a government agency can obligate funds to acquire FIP resources. It is part of the pre-procurement approval process, designed to ensure compliance with agency, department, and GSA requirements (such as those in the FIRMR). The APR is also designed to ensure that exceptions to full and open competition are well documented.

Planning Requirements: Agencies are required to report on planned and actual expenditures for information technology in accordance with OMB Circular A-11. Agency Information Resource Management (IRM) officials are responsible for monitoring requirements and developing plans to meet future needs that are the most advantageous to the Government (i.e., lowest overall

cost). FAA uses IRM reports and the Capital Investment Plan (CIP) to support agency FIP program requirements. Agency procurement request packages should reference the budget line item page number and/or CIP project that the proposed acquisition supports.

Circumstances Requiring an APR

An APR is needed in all cases where a proposed procurement will exceed the authority level delegated by OST. If the planned acquisition is not covered by a regulatory or specific agency DPA, the APR must be submitted to GSA. If the acquisition is within the departmental regulatory delegation threshold, then an APR shall be submitted to OST.

Blanket DPAs and Dollar Thresholds: OST has delegated limited procurement authority to the FAA, which has been redelegated, in full, to all FAA organizations (to the Associate Administrator or equivalent level). FIP resources of varying types may be combined and procured under a single procurement action. However, GSA approval is required when the price or charges for any one of these types exceeds the applicable dollar threshold (201-20.305-1). Requirements may not be separated in order to circumvent the thresholds. The thresholds referenced represent the purchase price of the information resource. Purchase price is the contract value over the entire contract life, including all options. Currently, the FAA has a blanket agency DPA for National Airspace Systems (NAS) operational telecommunications.

Competitive Procurement Thresholds: The basic procurement objective in satisfying FIP and telecommunications requirements is to obtain full and open competition through the use of competitive procedures. In recognition of attaining this objective, GSA has afforded federal agencies the most generous procurement authority when contracting under competitive procedures. This procurement authority has been extended to Small Business Administration (SBA) 8(a) set-aside contracting. It is the responsibility of each program office to construct their requirements and projects in a manner that will maximize competitive solutions.

Non-Competitive Procurement Thresholds: Very restrictive procurement authority has been afforded by GSA for contracting with requirements available from only one source and with make and model specifications, regardless of the number of competing contractors. This includes sole source 8(a) and specific make and model 8(a). Whenever possible, competitive contracting should be utilized. When an agency finds that competition cannot be attained in satisfying a FIP requirement, the procurement action must be justified

and approved. The FIRMR does not impose an additional layer of requirements, but instead relies on the Federal Acquisition Regulation (FAR) provisions and internal agency procedures. Be careful that all of the required analysis and studies that support other than competitive contracting are performed and documented. When there is only one responsible source or there is a make and model specification, a copy of the approved justification of other than full and open competition must be attached to the APR.

Preparation and Approval (APR Process)

Before Preparing an APR: For procurements requiring Acquisition Review Committee (ARC) approval, the APR should be submitted only after the ARC has given final approval to the Mission Need Statement. The Mission Need Statement contains information to comply with the FIRMR's Requirements Analysis and Analysis of Alternatives documentation requirements. The Mission Need Statement should then be attached to the APR. For smaller procurements not reviewed by the ARC, the APR should be prepared after the appropriate management level has approved the acquisition. Copies of the Requirements Analysis and the Analysis of Alternatives should be attached to the APR. For those procurements being acquired where only one responsible source exists or a specific make and model is required, the appropriate justification should be approved before submitting the APR. The approved justification should be attached to the APR when it is submitted to AIT. An APR must be approved by GSA/OST and a DPA granted before any solicitation can be issued. The quality of the material prepared heavily impacts the length of the APR/DPA process. A poorly prepared APR and supporting documentation can greatly lengthen the processing time. AIT-200 will gladly critique your draft documentation to be sure you are presenting an understandable request.

Description of Process: For a graphical depiction of the APR/DPA process, see Figure 22.2. The APR package is sent to AIT-1. AIT-200 (supporting AIT-1) reviews the package for FIRMR compliance and coordinates with the Office of Contracting and Quality Assurance (ASU). When approved by AIT-1, the formal FAA request is transmitted to the Office of Information Resource Management, M-30 in OST, acting on behalf of the OST DSO. During the OST review, a presentation on the proposed procurement may be requested. If this is necessary, M-30 will contact AIT-200 and the FAA project manager to set up the formal presentation. If the planned procurement requires OST approval only, M-30 will grant the delegation to the FAA in a memo to AIT-1. AIT-1 will redelegate the authority to the contracting officer through the program office. A copy of the DPA will be sent

to ASU by AIT. If the procurement requires GSA approval, M-30 will transmit the request to GSA. The formal GSA review and approval cycle begins when the APR is received at GSA. A few days after receipt of the APR, the Authorizations Branch of GSA may request a briefing by M-30 on the package. If this happens, the same briefing process described above will occur. GSA will usually approve or deny the request in as little as a week for smaller competitive procurements but may take up to 20 working days for larger comprehensive systems acquisitions. GSA will notify M-30, who will then notify AIT-1 by mail. You will be kept informed of the progress of the above process by AIT-200. The office originating the APR will receive notification from M-30 through AIT that the delegation has been granted and that the procurement can proceed. ASU also receives a copy of the memo. The memo granting the delegation and the APR upon which it is based should be held in the procurement documentation file for reference, particularly in the event that an amendment to the delegation is required to complete the project procurement during the contract life. The APR package consists of the APR and supporting documentation. The size of the APR submission package will vary with the size and complexity of the procurement. Supporting documentation includes the Requirements Analysis, the Analysis of Alternatives (or Mission Need Statement), and, where applicable, the conversion study, the findings to support compatibility-limited requirements, the sole source justification, etc. This material should be developed as part of the project planning and should not be viewed as an additional requirement of the APR.

APR Format: The APR format used to obtain a DPA from GSA is also used to obtain a DPA from OST, using their blanket authority. An APR quick reference can be found in the Guide to the Preparation of Agency Procurement Requests. The APR is nothing more than a formatted staff paper.

APR Supporting Documentation: The APR package contains the essential information needed by OST or GSA to grant a DPA. The package also contains certifying statements that the procurement satisfies all FIRMR and OST requirements. The supporting documentation for the procurement, when combined with the APR, constitutes the APR package referenced earlier. Please note that FIRMR documentation is required even for those acquisitions conducted under the FAA blanket authority and is not created solely for the APR. Because these are relatively small procurements, the size of each document will most likely be fairly small. The FIRMR requires agencies to establish and document requirements for FIP resources by conducting a Requirements Analysis commensurate with the size and complexity of the need. This Requirements Analysis is to be used as the basis for

analyzing alternatives to identify the most advantageous alternative to the Government, cost and other factors considered. The most favorable alternative becomes the project acquisition you are about to undertake. The information in the Requirements Analysis and Analysis of Alternatives is developed as a part of the normal FAA management decision making process. Management approval, budget commitments, etc., are based on the requirements and an examination of various alternative ways to fulfill those requirements. The APR documentation is a complete synopsis of the studies, not a requirement to perform another requirements or alternatives analysis. A Mission Need Statement fulfills the need for a Requirements Analysis statement and an Analysis of Alternatives statement. For those acquisitions for which a Mission Need Statement has been prepared, no additional requirements statement is needed.

Requirements Analysis (201-20.1) (Required with every APR): The Requirements Analysis documents requirements for FIP resources. It provides the basis on which the alternatives for meeting the requirements can be analyzed. Agencies are required to conduct a Requirements Analysis that is commensurate with the size and complexity of the need. Requirements should be expressed in the form of deficiencies in existing capabilities, new or changed program requirements, or opportunities for increased economy and efficiency. A contract for FIP resources is not a requirement. The requirement is for a means to an end. The contract is one of the alternative solutions. The FIRMR requires agencies to determine a system life as part of each Requirements Analysis. The system life is used during the Analysis of Alternatives to ensure that feasible alternatives are compared fairly over an identical, realistic time period. The statement of requirements that results from the Requirements Analysis is the basis for the Analysis of Alternatives. This statement must be documented and be a part of the APR package. Requirements should be expressed in non-technical terms without assuming that the reader knows what is being described. Requirements should be stated in terms of functions to be performed or the level of performance of functions, rather than how the functions will be accomplished. If at all possible, do not construct the requirements statement in a manner that would require non-competitive procurement.

Analysis of Alternatives (201-20.2) (Required with every APR): The previously completed Requirements Analysis is the basis for evaluating the alternatives. An Analysis of Alternatives should be performed for each identified

requirement. It's purpose is to compare and evaluate various alternatives for meeting the requirements and to determine which alternative is most advantageous to the Government. A Mission Need Statement fulfills the need for an Analysis of Alternatives statement. For those acquisitions for which a Mission Need Statement has been prepared, no additional Analysis of Alternatives statement is needed.

Findings To Support Compatibility-Limited Requirements (201-20.103-4): A compatibility-limited requirement is a statement of FIP resource requirements that requires the items to be compatible with existing FIP resources. Agencies are required to justify compatibility-limited requirements for FIP resources on the basis of at least one of the following:

- The agency has technical or operational requirements for compatibility when adding resources to, or replacing a portion of, an installed base of resources, and the agency determines that replacing additional portions of the installed base to avoid compatibility-limited requirements is not advantageous to the Government, or

- The agency determines that the risk and impact of a conversion failure on agency critical mission needs would be so great that acquiring non-compatible resources is not a feasible alternative

Conversion Study (201-20.203-4): A conversion study is used to assess the costs, risks, and magnitude of converting installed FIP resources to replacement or augmentation resources. A conversion study must be made for all FIP procurements unless it is an initial acquisition, acquires peripherals only, or is a purchase option on an existing lease.

Justification for Other Than Full and Open Competition: Justifications for other than full and open competition are required by the FAR (see FAR Subpart 6.3) whenever contracting under other than full and open competition. Sole source FIP acquisitions have no additional or different requirements than other forms of sole source acquisition.

Findings to Support Acquisition of Specific Make and Model (201-39.601): An acquisition that uses a specific make and model specification does not provide for full and open competition and must be justified and approved in accordance with FAR 6.303 and 6.304.

Transmittal Memos: The transmittal memo with the APR package attached should be sent from the Associate Administrator (or equivalent) for the Program Office requesting the DPA to the Associate Administrator for Information Technology (AIT-1).

Contacts

We would appreciate any comments and/or recommendations to improve the Guide to the Preparation of Agency Procurement Requests. Please send them to Jim Harris, 202-267-9994 or Kathy Simays Meader, 202-267-8183, both of AIT's IT Policy and Planning Division, AIT-200.

Point of Contact for Chapter 22 is Kathy Simays Meader, AIT-200, 202-267-8183.

LEVELS OF APPROVAL FOR DELEGATIONS

PROCUREMENT TYPE	DOLLAR VALUE	DELEGATION	APPROVAL LEVEL	APR
AVAILABLE FROM ONLY ONE RESPONSIBLE SOURCE (SOLE SOURCE) OR SPECIFIC MAKE AND MODEL (INCLUDING SOLE SOURCE 8(a) AND SPECIFIC MAKE AND MODEL 8(a))	UP TO $50,000	REGULATORY	DOT OPERATING ADMINISTRATION	NONE REQUIRED
	$50,000 TO $250,000	REGULATORY	DIRECTOR, OIRM	REQUIRED FOR SUBMISSION TO DIRECTOR, OIRM
	OVER $250,000	SPECIFIC ACQUISITION	GSA	REQUIRED FOR SUBMISSION TO GSA VIA DIRECTOR, OIRM
ALL OTHER COMPETITION TYPES (INCLUDES ALL 8(a) CONTRACTS, DIRECTED AND COMPETITIVE, EXCEPT AS NOTED ABOVE)	UP TO $300,000	REGULATORY	DOT OPERATING ADMINISTRATION	NONE REQUIRED
	$300,000 TO $2,500,000	REGULATORY	DIRECTOR, OIRM	REQUIRED FOR SUBMISSION TO DIRECTOR, OIRM
	OVER $2,500,000	SPECIFIC ACQUISITION	GSA	REQUIRED FOR SUBMISSION TO GSA VIA DIRECTOR, OIRM
SPECIAL PROCUREMENTS	ANY	REGULATORY	DIRECTOR, OIRM	REQUIRED FOR SUBMISSION TO DIRECTOR, OIRM
PRIVATE EXCHANGE	ANY	REGULATORY	DIRECTOR, OIRM	REQUIRED FOR SUBMISSION TO DIRECTOR, OIRM
FAA NATIONAL AIRSPACE (NAS) OPERATIONAL COMMUNICATIONS BLANKET DELEGATION OF AUTHORITY (SEPTEMBER 26, 1991)	ANY	AGENCY	DOT OPERATING ADMINISTRATION	NONE REQUIRED

FIGURE 22.1

AGENCY PROCUREMENT REQUEST/DELEGATION OF PROCUREMENT AUTHORITY PROCESS

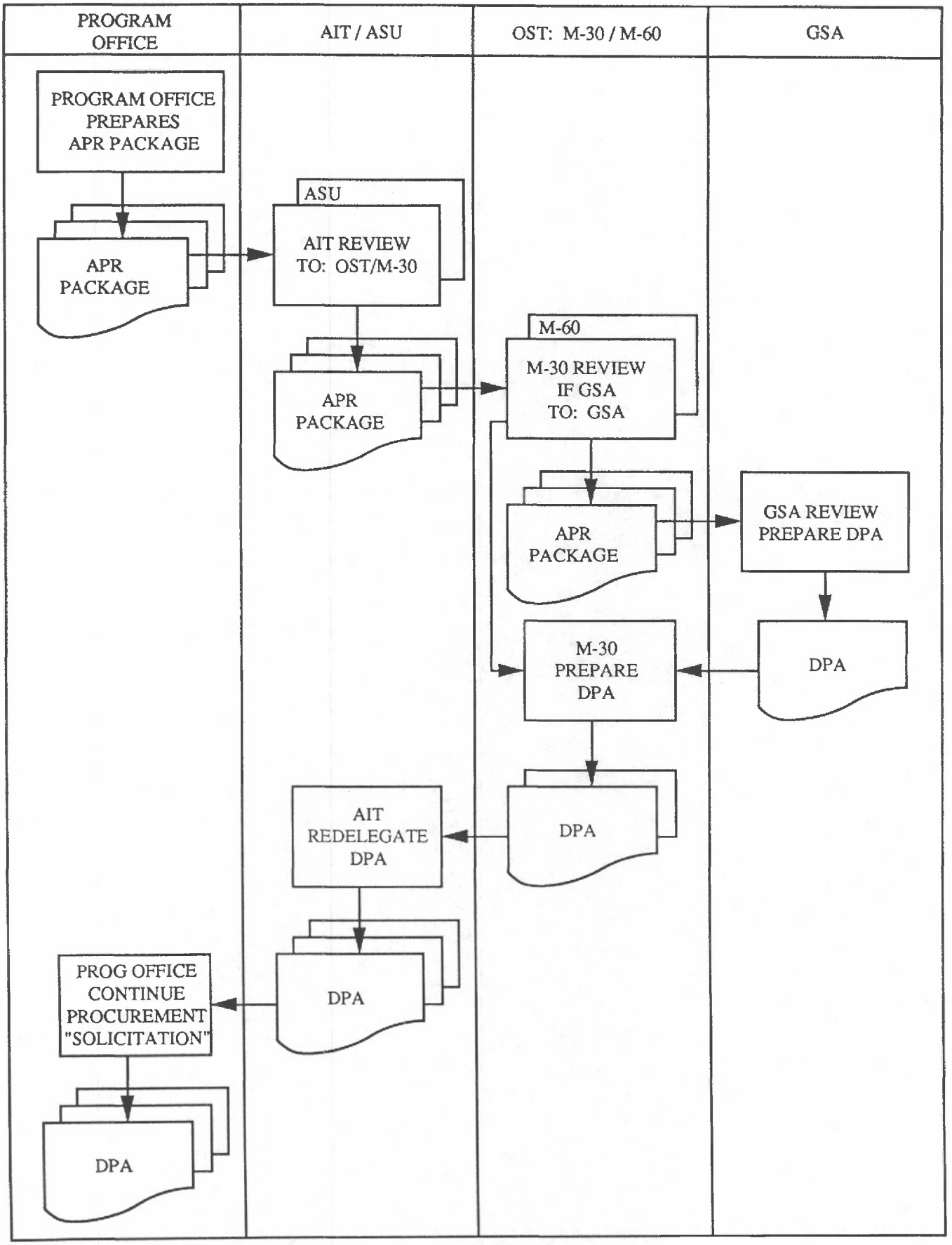

FIGURE 22.2

Chapter 23

Lessons Learned

This chapter provides information on lessons learned that have broad application to the acquisition process, but are not related to one specific chapter in this guide. The items presented here are divided into two groups: general acquisition topics and contract considerations.

General Acquisition Topics

- Plan program schedules and budgets realistically. Historically, it has taken 7 to 12 years (and longer for more complex systems) to field new capability. Experience has shown it is difficult or impossible to make up lost time through "work-around" action in the acquisition process. Everything takes longer, costs more, and requires more coordination than appears necessary on the surface.

Some major reasons for lost time in the acquisition process are:

  - Failure to adequately define or revalidate requirements at each KDP, and maintain customer involvement throughout the process
  - Failure to complete development before authorizing full production go-ahead
  - Failure to control changes to program and contract requirements
  - Inadequate attention to the complexities of software development, hardware/software integration and testing
  - Administrative delay in getting approval of critical documents, and incomplete documentation

- The PM should form a project team or integrated product development team composed of the technical, logistics, contractual, operational, and other specialists needed to accomplish program objectives as soon as possible after the program is established. Failure to do so usually results in confusion, schedule slippage, and costly rework of requirements and procurement documents. Meeting milestones in an acquisition is the result of a joint team effort, not an individual effort.

- Users must be involved in all phases of a program from development of requirements to deployment in the field. User input during program formulation facilitates acceptance of the product. User input should be obtained continuously to revalidate requirements, provide input on proposed changes, assess impact of changes and address training, transition, and NAILS issues.

- In almost all acquisitions, certain key requirements drive system acquisition and life-cycle costs. At the start of every development program, determine if cost-driving requirements can be relaxed and still meet all essential requirements, or if NDI equipment can be used to reduce costs, risk, or improve schedule. Unless these cost-drivers are identified and controlled up front, the project has little chance of being completed within budget.

- When needed, risk reduction tasks should be funded along with the basic acquisition to increase confidence that the system will perform as intended and at the lowest acceptable cost and technical risk.

- Up to 90 percent of the life-cycle cost of a major project is in operations and support. An objective in development and acquisition should be to minimize life-cycle costs. A small additional investment in R&D and acquisition often results in substantial savings in operations and support costs. Training, documentation, spares, staffing, and other NAILS requirements should be identified at the PRR and NAILSMT, not at the DRR.

- PMs must consider how changes in the state-of-the-art over a system's life cycle will affect support and product improvement efforts. Plan to take advantage of improvements as part of a pre-planned product improvement program.

- Specifications and standards must be tailored to the requirements of each acquisition. Functional specifications are appropriate for most procurements. Most specifications reference other specifications in a way that can have a major impact on product cost. Every referenced specification should be reviewed to determine if it is appropriate for use "as is" or whether it should be tailored to the requirements of the procurement. Requirements that are not necessary, unenforceable, or that there is no intention of enforcing should not be included.

- The use of NDI that is commercially available and capable of fulfilling essential FAA needs may minimize or eliminate costly, time-consuming research and development. NDI offers an opportunity to field state-of-the-art technology rapidly, particularly in the electronics/communications fields. With

NDI, there is almost always integration required with other FAA systems. Support of NDI during its deployment as part of the NAS must be carefully evaluated during the market analysis process to ensure FAA needs can be met. The FAA can take advantage of savings in cost, time, support, and maintenance.

- Early industry involvement in the acquisition process can provide excellent feedback to the project manager, particularly on the availability of NDI. Ways to obtain early industry involvement include releasing draft specifications for review, briefing industry on program plans, issuing draft solicitations, and meeting with individual companies.

- T&E is key to a successful program. The test and evaluation master plan (TEMP) and philosophy should be developed concurrently with the acquisition strategy. Subsystem and component testing should be used to determine whether software, products, or piece parts meet requirements so that necessary adjustments can be made early in the program. We can avoid many problems, particularly those dealing with deficiencies found during OT&E when we do adequate testing early on. When acquiring NDI, use of existing test data and information should be considered instead of Government testing. In order to make up for schedule delays, testing should not be reduced or eliminated, because historically this has resulted in major operational problems and higher program costs.

- Software and hardware/software integration account for a disproportionate share of the problems encountered on many NAS programs. Historically, initial time and cost estimates to develop and produce complex software have been grossly underestimated. This causes schedule delays, cost increases, non-delivery of specified functionality, and substantial increases in the lines of code to be developed or modified. To minimize software problems, we must track the implementation of each specified requirement into software code, as well as maintain indepth visibility into the software development, integration and documentation process. Because knowledge does not guarantee a quality product, these steps will not automatically cause software to be delivered on schedule and within cost. But they will reduce the number of unexpected problems and improve the PMs ability to retain the initiative.

- Design of the acquisition strategy is as important as the system design. Procurement planning should start early, and acquisition strategy approved by senior management before the plan is finalized. Considerable confusion exists as to when a Delegation of Procurement Authority is required from

GSA. This issue must be resolved in the planning process to avoid lengthy delays. AIT-340 should be contacted to clarify any issues in this area.

- o At the beginning of the program/project, program offices should coordinate with the Telecommunications Management and Operations Division (ASM-300) to ensure that telecommunications needs can be fulfilled. In order to minimize stand-alone independent telecommunications networks and to maximize the use of FAA-owned networks versus leased networks, all NAS programs with telecommunications connectivity requirements must comply with Orders relating to telecommunications management. (A draft Order, Telecommunications Asset Management is currently being prepared by ASM-300 for review and comment).

- o Site-specific installation issues are not usually addressed early enough in the program. Involving the potential users early can pinpoint issues that can be potentially troublesome and costly if left to be addressed at the DRR.

Contract Considerations

Some major reasons for lost time in the contracting process are:

- Budgeting for program success based on "best case" outcomes for all program activities

- Requesting the ARC or TSARC to waive program documentation requirements in order to "speed up" program implementation. This seldom, if ever, occurs.

- Avoiding getting a DPA from GSA. If there are Federal Information Processing Resources involved, it needs a DPA and a solicitation cannot be issued, let alone a contract, without a DPA.

- "Turning on" a contractor to making system changes before obtaining a proposal or "not-to-exceed" cost

- Using an overly optimistic delivery date to motivate early completion

- o The contractor is required to submit a fully priced proposal for all changes issued by the Contracting Officer to an existing contract. No changes should be included in any contract without full agreement on cost, schedule, and technical adjustments. If it is not possible to reach an agreement on cost before work starts, a ceiling price should be included in the contract modification to cover the changed work.

- Be extremely careful not to make constructive changes to contracts. Constructive changes occur when a person in authority other than the CO directs a contractor to do something outside the scope of the contract. Once performed, the contractor can bill the Government for all associated costs. Such changes are often used by contractors to "get well" on projects that are experiencing cost and schedule overruns. All changes to a contract must be implemented by the CO after cost, supportability and/or schedule impacts are agreed to by the Government and the contractor.

- Changing contracts after award is very costly and usually delays the program. Generally, major configuration changes should be introduced at the beginning of production to avoid re-work and change to an existing contract. "Work around" efforts to get a project back on schedule are rarely successful, even when significant additional funds are added to accelerate the process. Where changes reduce contract requirements, the Contracting Officer is required to obtain consideration from the contractor.

- Interface issues have caused major problems on NAS programs. The FAA has awarded contracts with equipment interfaces either partially defined or with interfaces to be defined later, especially when other equipment requiring an interface is also being developed. Since defining interfaces after award requires a contract change that usually extends delivery schedules and increases cost, interfaces should be defined as completely as possible at the time of contract award. If interfaces cannot be completely defined, funding should be reserved to cover probable cost increases, and management attention should be focused on this issue throughout the acquisition.

- Schedule slippage is often caused by problems resulting from poor quality. Most quality problems are, in turn, associated with poor definition of requirements, poor engineering, or inadequate testing. Additional efforts in the requirements/specifications development process and at preliminary and critical design reviews usually pay high dividends with respect to achieving a higher quality product. Poor engineering is almost always obvious at preliminary design review (PDR) and critical design review (CDR). PMs sometimes allow contractors to proceed before these PDR/CDR problems are fixed. Such actions to keep a project on schedule usually end up causing much greater slippage later in the program.

- Protests occur on many competitive contract actions. Most are not justified and are rejected. To provide for the FAA's defense, selection procedures must be followed exactly

as set forth in the approved selection plan. Adequate documentation must be maintained during the evaluation process to record how judgements are made. This documentation is needed by the FAA legal staff to defend against possible protests. (In some cases, support contractors involved in the pre-award technical evaluation of a procurement have been reluctant to support the FAA in protests unless pressure was applied). Support contractors that assist in conducting technical evaluations should have a SOW requirement in their contract requiring them to assist the FAA in the event of a protest.

- Significant time is lost in the procurement process by failure of the program office to develop clear, tailored statements of work and specifications before submitting the procurement request. The CO and contracting staff should be involved when the procurement request is being developed and draft documents released for industry review and comment.

- Effective contract administration is necessary to obtain a product that satisfies Government requirements. Adequate contract administration can avoid claims or loss of legal rights that occur when actions required by the contract have not been taken.

- Contract administration must be considered when structuring the solicitation. Generally, simple and straightforward contract provisions are the easiest to administer and change. Many contracts have scores of modifications over their life, and complex provisions are subject to dispute, especially when changed. The courts have generally held that the Government, as the author of the contract, is responsible for providing clear, unambiguous terms and conditions within the contract.

- Priced options should be included in all competitive production contracts to the maximum extent possible so FAA can obtain the best prices for possible new requirements that may arise during the life of the contract. "Possible" is defined as any potential requirement relative to the procurement that has some historic precedent. Option provisions can eliminate the need for new contracts, including sole-source extensions of existing contracts.

- Proper contractor staffing at the beginning of a project is essential. Manpower or critical skill shortages during the initial design phase usually result in schedule delays and cost increases later on. PMs must consistently compare planned manpower and material cost against actual cost to verify that adequate resources are being applied.

- The QRO is a valuable asset in the program. Since this officer is "in plant", he/she should be part of all program/contract reviews to keep the PM informed about programs, problems, factory issues (e.g., lack of staff, potential labor unrest), etc. However, quality can't be "inspected in" after the equipment is built. It must be planned right from the start.

- A contract type that matches the need for flexibility should be used

- ASU should be involved in draft reviews of the PR package, including the Statement of Work, specifications, data requirements, and other sections and not see it for the first time when the PR is officially received

Contacts

The following groups can be contacted for additional information on the issues presented in this chapter:

- AND-3, 202-267-8218

- ACQ-1, 202-267-8506

- ASU-1, 202-267-8513

Point of Contact for Chapter 22 is Robert Bernard, ANN-600, 202-267-6511.

APPENDIX A

NAS CHANGE PROPOSALS

CASEFILE/ NAS CHANGE PROPOSAL
(Please Type or Print Neatly)

FOR CM USE | Case File Received Date | NCP Number | Page 1 of ____

1. Case File Number

2. Preprocessing Office: ☐ ASM- ☐ ATR- ☐ ASE-300 ☐ ANS-200 ☐ AFE-100 ☐ AFM-160 ☐ ____

3. Scope of Change: ☐ Local ☐ National ☐ Test ☐ CIP

4. Program Element: ☐ Air Traffic Control ☐ Interfacility Comm ☐ Ground-to-Air ☐ Maint & Ops Support ☐ ____

5. Life-Cycle Baseline: ☐ Requirements Determination ☐ Operational
Acquisition: ☐ Functional ☐ Allocated ☐ Design ☐ Products

6. Priority: ☐ Normal ☐ Time Critical ☐ Urgent

7. Supplemental Change Form: ☐ ECR/ECP ☐ TES ☐ ____
7a. Supplemental Change No. ____
7b. Supplemental Change Initiation Date ____

8. Case File Originator | 9. Originator's Organization | 10. Telephone Number | 11. Case File Initiation Date

12. Baseline Document Type: ☐ CPFS ☐ SPEC ☐ MTBK ☐ ____ ☐ T.I ☐ DWG ☐ IRD/ICD

13. Baseline Document Number(s)

14. CI Subsystem Designator | 15. FA Type | 16. CI Component Designator

17. Facility Identifier (FACID) | 18. Facility Code (FACCODE) | 19. Cost Center Code | 20. Software System Version

21. Title (as descriptive as possible including location and runway number if applicable)

22. Description: (a) identification of problem, (b) proposed change, (c) interface impact, (d) cost, (e) benefits, (f) schedule, (g) justification of time critical/urgent status

Blocks 1 through 22 are to be completed by originator and/or coordinator. If a block is not applicable, write N/A. Attach additional sheets if necessary. See current revision of NAS-MD-001 for detailed completion instructions.

FAA Form 1800-2 (11-90) - Supersedes Previous Edition

Case File Number	NCP Number	Page 2 of ____

23. Name and Title of Originator's immediate supervisor (Type/Print Clearly)	Signature	Date

24. Faculty/Sector Review (AT/AF)

Name	Routing Symbol	Date	Concur	Non-concur

Routing Symbol	Signature
Date	
Routing Symbol	Signature
Date	

24a. Comments

(Attach additional sheets if necessary)

25. Regional Review (AT/AF/FS/AS)

Name	Routing Symbol	Date	Concur	Non-concur

☐ Recommend Approval (Enter into CM/stat, Forward to Prescreening Office) ☐ Disapprove (Return to Originator)

Routing Symbol	Signature
Date	
Routing Symbol	Signature
Date	
Routing Symbol	Signature/Configuration Mgr/NCP Coordinator Reg Exec Sec
Date	

25a. Comments

(Attach additional sheets if necessary)

26. Prescreening Review Organization Comments

(Attach additional sheets if necessary)

Reviewer	Routing Symbol	Date	Concur	Non-concur

☐ Recommend Approval ☐ Recommend Disapproval (Return Original to Originating Office through the Regional NCP Coordinator)

Routing Symbol	Signature
Date	

Recommended Must Evaluators

27. For Configuration Management Use Only

APPENDIX B

ACRONYMS AND ABBREVIATIONS

Acronyms And Abbreviations

AAC	Mike Monroney Aeronautical Center
AAF	Associate Administrator for Airway Facilities
AAP	Program Manager for Advanced Automation
AAS	Advanced Automation System
AAT	Associate Administrator for Air Traffic
ABA	Assistant Administrator for Budget and Accounting
ABU	Office of Budget
ACD	Engineering Research and Development Service
ACF	Area Control Facility
ACN	Engineering, Test and Evaluation Service
ACQ	Office of Acquisition Policy and Oversight
ACT	FAA Technical Center
ACW	Engineering, Integration, and Operational Evaluation Service
ADA	FAA Deputy Administrator
ADLS	Aeronautical Data Link System
ADP	Automated Data Processing
ADPE	Automated Data Processing Equipment
AF	Airway Facilities
AFE	Facility System Engineering Service
AFS	Flight Standards Service
AFSS	Automated Flight Service Station
AGC	FAA Chief Counsel
AHR	Assistant Administrator for Human Resource Management
AHT	Office of Training and Higher Education

AIT	Office of the Assistant Administrator for Information Technology
ALM	Life-Cycle Management Service
ALR	Office of Labor and Employee Relations
AMA	FAA Academy
ANA	Program Director for Automation
ANC	Program Director for Communications and Aircraft Acquisition
AND	Associate Administrator for NAS Development
ANFCCB	NAS Facilities Configuration Control Board
ANN	Program Director for Navigation and Landing
ANR	Program Director for Surveillance
ANS	NAS Transition and Implementation Service
ANW	Program Director for Weather and Flight Service Systems
AOA	FAA Administrator
AOP	NAS Operations Service
AOR	Operations Research Service
AOS	Operational Support Service
AP	Acquisition Plan
APM	Associate Program Manager, or NAS Program Management Service
APMC	Associate Program Manager for Contracting
APME	Associate Program Manager for Engineering
APMGC	Associate Program Manager for Legal
APML	Associate Program Manager for Logistics
APMM	Associate Program Manager for Operations
APMP	Associate Program Manager for Procedures
APMQ	Associate Program Manager for Quality

APMR	Associate Program Manager for Requirements
APMRD	Associate Program Manager for Research and Development
APMSE	Associate Program Manager for System Engineering
APMT	Associate Program Manager for Testing
APR	Agency Procurement Request
ARC	Acquisition Review Committee
ARD	Research and Development Service
ARSR	Air Route Surveillance Radar
ARTCC	Air Route Traffic Control Center
ARTS	Automated Radar Terminal System
ASD	Associate Administrator for Systems Engineering and Development
ASDE	Airport Surface Detection Equipment
ASE	NAS System Engineering Service
ASM	System Maintenance Service
ASR	Airport Surveillance Radar
ASU	Office of Acquisition Support
AT	Air Traffic
ATC	Air Traffic Control
ATCT	Airport Traffic Control Tower
ATH	Office of Air Traffic System Effectiveness
ATQ	Office of Independent Operational Test and Evaluation Oversight
ATR	Air Traffic Requirements Service
ATZ	Office of Air Traffic Program Management
AVN	Office of Aviation System Standards
AWPG	Aviation Weather Products Generator

AXD	Executive Director for Systems Development
AXQ	Executive Director for Acquisition and Safety Oversight
BAFO	Best and Final Offer
BUEC	Backup Emergency Communications
CAI	Contract Acceptance Inspection
CASE	Computer-Aided Software Engineering
CBA	Cost/Benefit Analysis
CCB	Configuration Control Board
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CHAP	Chapter
CI	Configuration Item
CIP	Capital Investment Plan
CM	Configuration Management
CNS	Communications, Navigation, and Surveillance
CO	Contracting Officer
COI	Critical Operational Issues
CONOPS	Concept of Operations
CONT	Continued
COR	Contracting Officer's Representative
COTR	Contracting Officer's Technical Representative
COTS	Commercial Off-the-Shelf
CSQPP	Computer Software Quality Program Plan
CWP	Central Weather Processor
DBMS	Data Base Management System
DD	Design Document

DFP	Detailed Financial Plan
DID	Data Item Description
DIR	Directive
DLP	Data-Link Processor
DMN	Data Multiplexing Network
DOCCON	Documentation and Configuration Identification System
DOD	Department of Defense
DOT	Department of Transportation
DPA	Delegation of Procurement Authority
DRR	Deployment Readiness Review
DSO	Designated Senior Official
DT&E	Developmental Test and Evaluation
EBBS	Electronic Bulletin Board System
ECP	Engineering Change Proposal
EM	Element Manager
ERB	Executive Review Board
ERC	Executive Resource Committee
EXCOM	Executive Committee
FAA	Federal Aviation Administration
FAR	Federal Acquisition Regulation
FBCN	Financial Baseline Change Notice
FCA	Functional Configuration Audit
F&E	Facilities and Equipment
FIP	Federal Information Processing
FIRMR	Federal Information Resource Management Regulation
FS	Flight Standards

FSAT	Facility System Analysis Tool
FSD	Full Scale Development
FSR	Financial Status Review
FSS	Flight Service Station
FTE	Full Time Equivalent
FWG	Functional Working Group
FY	Fiscal Year
GAO	Government Accounting Office
GIDEP	Government Industry Data Exchange Program
GSA	General Services Administration
GTR	Government Technical Representative
HDBK	Handbook
HF	Human Factors
HFE	Human Factors Engineering
HFP	Human Factors Plan
HVAC	Heating, Ventilating, and Air Conditioning
HWCI	Hardware Configuration Item
ICD	Interface Control Document
ICSS	Integrated Communications Switching System
ICWG	Interface Control Working Group
IG	Inspector General
ILS	Integrated Logistics Support
ILSP	Integrated Logistics Support Plan
INST	Instruction
IOT&E	Independent Operational Test and Evaluation
IR	Interface Revision

IRD	Interface Requirements Document
IRM	Information Resource Management
ITWS	Integrated Terminal Weather System
JOTFOC	Justification for Other than Full and Open Competition
KDM	Key Decision Memorandum
KDP	Key Decision Point
KMOR	Key Measures of Operational Readiness
LCC	Life Cycle Cost
LCF	Local Control Facility
LDRCL	Low Density Radio Communications Link
LOC	Lines of Code
LSA	Logistics Support Analysis
MA	Major Acquisition
MAR	Major Acquisition Review
MCF	Metroplex Control Facility
ME	Maintenance Engineering
MIL	Military
MLS	Microwave Landing System
MNA	Mission Needs Analysis
MNAT	Mission Needs Analysis Team
MNS	Mission Need Statement
MSA	Major System Acquisition
MSS	Master Scheduling System
MTP	Master Test Plan
N/A	Not Applicable
NAATS	National Association of Air Traffic Specialists

NADIN	National Airspace Data Interchange Network
NAGE	National Association of Government Employees
NAILS	National Airspace Integrated Logistics Support
NAILSMT	NAILS Management Team
NAS	National Airspace System
NASA	National Aeronautics and Space Administration
NAS CCB	NAS Configuration Control Board
NATCA	National Air Traffic Controllers Association
NCF	National Control Facility
NCP	NAS Change Proposal
NDI	Nondevelopmental Item
NO	Number
NOAA	National Oceanic and Atmospheric Administration
NPI	NAS Program Initiative
OIRM	Office of Information Resource Management
OJT	On-The-Job Training
OMB	Office of Management and Budget
OPMT	Operational Planning Management Team
OPS	Operations
ORD	Operational Requirements Document, or Operational Readiness Date
OST	Office of the Secretary of Transportation
OT&E	Operational Test and Evaluation
PA	Project Authorization
PASS	Professional Airways Systems Specialists
PAT&E	Production Acceptance Test and Evaluation
PCA	Physical Configuration Audit

PD	Program Directive
PDR	Preliminary Design Review
PDSR	Program Director Status Review
PEM	Production Engineering Management
PIP	Program Implementation Plan
PM	Program Manager
PMP	Program Master Plan
POV	Privately Owned Vehicle
PR	Procurement Request
PRR	Procurement Readiness Review, or Program Readiness Review
PSAT	Power System Analysis Tool
QA	Quality Assurance
Q&A	Questions and Answers
QAS	Quality Assurance Specialist
QC	Quality Control
QCSP	Quality Control System Plan
QRO	Quality Reliability Officer
QTR	Quarter
RAS	Resource Allocation Subcommittee
RCE	Radio Control Equipment
RCL	Radio Communications Link
RCR	Routing and Circuit Restoral
R&D	Research and Development
R,E&D	Research, Engineering and Development
RFI	Radio Frequency Interference
RFP	Request for Proposal

RMA	Reliability, Maintainability and Availability
RMP	Risk Management Plan
RPI	Research Project Initiative
RTG	Routing
SAMP	Software Acquisition Management Plan
SBA	Small Business Administration
SC	Steering Committee
SCE	Software Capability Evaluation
SCR	Schedule Change Request
SDP	Software Development Plan
SE	System Engineering
SEB	Source Evaluation Board
SEBOB	SEB Oversight Board
SE CCB	System Engineering Configuration Control Board
SE&D	System Engineering and Development
SEI/ SEIC	System Engineering and Integration (Contractor)
SEOAT	System Engineering/Operational Analysis Team
SESG	Software Engineering Specialty Group
SETA	System Engineering and Technical Assistance
SIWG	Software Interface Working Group
SLSR	Senior Level Status Review
SOP	Standard Operating Procedure
SOW	Statement of Work
SPEC	Specification
SR	System Requirement
SRB	Specification Review Board

SRS	System Requirements Specification
SS	System Specification
STD	Standard
STVS	Small Tower Voice Switches
TAM	Transportation Acquisition Manual
TATCA	Terminal Air Traffic Control Automation
TDWR	Terminal Doppler Weather Radar
T&E	Test and Evaluation
TEMP	Test and Evaluation Master Plan
TIM	Technical Interchange Meeting
TMS	Traffic Management System
TOR	Technical Officer's Representative
TPRC	Test Policy Review Committee
TRACON	Terminal Radar Approach Control
TRDRE	Terminal Radar Digitizing, Replacement, and Establishment
TSARC	Transportation Systems Acquisition Review Council
TVSR	Terminal Voice Switch Replacement
USAF	United States Air Force
VRTM	Verification Requirements Traceability Matrix
VSCS	Voice Switching and Control System
WBS	Work Breakdown Structure

APPENDIX C

LIST OF DOCUMENTS
PROCEDURES FOR OBTAINING
COPIES OF DOCUMENTS

List Of Documents

This listing includes not only those documents used in the various chapters of the Program Manager's Guide, but other documents recommended for background reading by the authors of the guide.

The NAS Documentation and Configuration Identification System (DOCCON) is a document storage facility which is located in the World Trade Center building. Copies of most of the documents listed in this appendix may be obtained from this facility. There are several procedures for using this facility and these are described at the end of the document listing.

FAA Order 1100.2C, Organization - FAA Headquarters

FAA Order 1320.1D, FAA Directives System

FAA Order 1370.52C, Information Resources Management - Policies and Procedures

FAA Order 1370.71, Procurement Authority for Information Resources and ADP

FAA Order 1600.54B, FAA Automated Information Systems Security Handbook

FAA Order 1800.8F, NAS Configuration Management

FAA Order 1800.57A, Establishment of the National Airspace System (NAS) Configuration Control Board (CCB)

FAA Order 1800.58A (Draft), National Airspace Integrated Logistics Support (NAILS) Policy

FAA Order 1800.63, National Airspace System (NAS) Deployment Readiness Review (DRR) Program

FAA Order 1810.1F, FAA Acquisition Policy

FAA Order 1810.2, Independent Operational Test and Evaluation for Major Systems Acquisition

FAA Order 1810.4B, NAS Test and Evaluation Program

FAA Order 1810.6, Policy For the Use of Nondevelopmental Items (NDI) in FAA Acquisitions

FAA Order 1810.X (Draft), Acquisition

FAA Order 1830.2B, Telecommunications Standards Selection and Implementation Policy

FAA Order 2500.10R, Operations Appropriation Call for Estimates

FAA Order 2500.22X, Call for Estimates - R,E&D Appropriation

FAA Order 2500.55, Call for Estimates - Facilities and Equipment

FAA Order 3710.7C, Labor Management Relations Program

FAA Order WA 4400.1, Guide for Preparing Procurement Requests

FAA Order 4405.6B, Review and Approval of Proposed Other Than Full and Open Competition Procurements

FAA Order 4405.15, Reprocurement Data Acquisition Policy

FAA Order 4453.1A, Quality Assurance of Material Procured by FAA

FAA Order 4453.2B, FAA Quality Control System Certification Program

FAA Order 4470.1, FAA Participation in GIDEP

FAA Order 4560.1B, Policies and Procedures Covering the Provisioning Process During the Acquisition of FAA Materiel

FAA Order 4630.8, Quality Assurance Policy

FAA Order 4630.9A, FAA Computer Software Quality Program Requirements

FAA Order 6000.30B, Policy for Maintenance of the National Airspace System (NAS) Through the Year 2000

FAA Order 6000.38, Policy to Determine NAS Equipment Sparing Requirements for Airway Facilities Work Center

FAA Order 9550.8, Human Factors Policy

FAA Notice 1810.2, Procurement Readiness Review (PRR) Process

FAA Notice 1370.36, NAS Programming Language Procedure (Ada Policy)

FAA Form 1800-2, NAS Change Proposal Form

DOT Order 1350.2, Establishment of a Departmental Information Resources Management Manual System

DOT Order 4200.14C, Major Acquisitions

DOT Order 4200.16A, Advance Acquisition Planning and Annual Procurement Plan

FAA-STD-002, Preparation of Engineering Drawings

FAA-STD-005, Preparation of Specification Documents

FAA-STD-013, Quality Control Program Requirements

FAA-STD-016A, Quality Control System Requirements

FAA-STD-018, Computer Software Quality Program Requirements

FAA-STD-021, Configuration Management (Contractor Requirements)

FAA-STD-024, Preparation of T&E Documentation

FAA-STD-025, Preparation of ICDs

FAA-STD-026, NAS Software Development

FAA-STD-029, Selection and Implementation of Telecommunications Standards

FAA-STD-035, Commercial Equipment, Market Research for

FAA-STD-039, NAS Open System Architecture and Protocols

FAA-G-1210d, Provisioning Technical Documentation

FAA-G-1375c, Spare Parts-Peculiar for Electronic, Electrical, and Mechanical Equipment

FAA-G-2100F, Electronic Equipment, General Requirements

FAA-HDBK-XXX (Draft), FAA Software Management Indicators Handbook

FAA-HDBK-*** (Draft), NAS Tailoring Guide for FAA-STD-026

NAS-DD-1000, NAS Level I Design Document

NAS-MD-001, NAS Subsystem Baseline Configuration and Documentation Listing

NAS-MD-110, T&E Terms and Definitions for NAS

NAS-SR-1000, NAS System Requirements Specification

NAS-SS-1000, NAS System Specification

Capital Investment Plan (CIP)

Research, Engineering and Development (R,E&D) Plan

Business Manager's Financial Handbook, published October 1992 (to be updated in the May 1994 timeframe)

FAA Capital Investment Planning Process for FY 1996, September 1993

Annual Procurement Plan

Advance Acquisition Plans

Financial Management System

Software Management Indicators Handbook

Advisory Circular 00-41, FAA Quality Control System Certification Program

Advisory Circular 00-53, FAA Computer Software Quality Program

1993 NATCA/FAA negotiated agreement, Articles 7 and 48

1992 PASS(AF)/FAA negotiated agreement, Articles 69 and 70

1993 NAATS/FAA negotiated agreement, Article 9

1993 PASS(FS)/FAA negotiated agreement, Articles 68 and 69

DOT/FAA/ES-85/01, NAS Interface Management Plan

CCB Charters and Operating Procedures - Charters and Operating Procedures for program CCBs (acquisitions), regional CCBs, the AT CCB, and the ME CCB

Guidance and Implementation Planning for the Conduct of Formal Configuration Audits, Revision 5, dated January 29, 1988 - Guidelines published by SEIC for ASE-3.2 for planning and conducting of PCAs and FCAs

Configuration Management Procurement Guidance, Revision 4, dated October 26, 1989 - Guidelines published by SEIC for ASE-3.2 for the application of FAA-STD-021 on project acquisition contracts

"Source Selection Delegation", memorandum from the Secretary of Transportation to the Administrator, dated December 20, 1987

Guide to the Preparation of Agency Procurement Requests (AIT publication), dated February 1994

FAA Acquisition Manual Subchapter 1204.70, Preparation, Approval and Processing of Procurement Requests

Transportation Acquisition Regulation, sub-part 1206.3

Transportation Acquisition Manual (TAM) Chapter 34, Appendix A, Major Acquisition Policies and Procedures

Transportation Acquisition Manual, Sub-chapter 1215.6, Source Selection

Air Force Systems Command Regulation 84-2, Production Readiness Review

OMB Circular A-11

OMB Circular A-109, Major Systems Acquisition

OMB Bulletin 93-03

DOD-DIR-4245.6, Defense Production Management

DOD-DIR-5000.1, Major Systems Acquisitions

DOD-DIR-5000.39, Acquisition and Management of Integrated Logistics Support for Systems and Equipment

DOD-DIR-5010.19, DOD Configuration Management Program

DOD-INST-5000.2M, Major Systems Acquisition Procedures

DOD-INST-5000.38, Production Readiness Reviews

DOD-INST-7000.2, Performance Measurement for Selected Acquisitions

DOD-INST-7000.10, Contract Cost Performance, Funds Status and Cost/Schedule Status Reports

DOD-STD-480A, Configuration Control

DOD-STD-481A, Configuration Control Engineering Changes

DOD-STD-1686, Electrostatic Discharge Control Program

DOD-STD-2167A, Defense System Software Development

MIL-H-46855, Human Engineering Requirements for Military Systems, Equipment, and Facilities

MIL-STD-499, Engineering Management

MIL-STD-882B, System Safety Program Requirements

MIL-STD-965A, Parts Control Program

MIL-STD-973, Configuration Management, Paragraph 5.5 Configuration Status Accounting, and Paragraph 5.6 Configuration Audits

MIL-STD-1388-1A, Logistics Support Analysis

MIL-STD-1388-2A/2B, DOD Requirements for Logistics Support Analysis Record

MIL-STD-1472, Human Engineering Design Criteria for Military Systems, Equipment, and Facilities

MIL-STD-1521B, Technical Reviews and Audits for Systems, Equipment, and Computer Programs

MIL-STD-1561B, Provisioning Procedures

MIL-STD-1815A, ADA Programming Language

MIL-STD-2000, Standard Requirements for Soldered Electrical and Electronic Assemblies

MIL-HDBK-287, Tailoring Guide for DOD-STD-2167A, Defense System Software Development

DI-MCCR-80030A

RTCA DO-178B

Software Management Indicators Handbook

Federal Information Resource Management Regulation (FIRMR)

Federal Service Labor-Management Relations Statute, 5 U.S.C. Chapter 71

Federal Acquisition Regulation, sub-part 6.3

Federal Acquisition Regulation 34.001

Federal Acquisition Regulation 52.246-2

Federal Acquisition Quality Assurance Regulation, Part 46

Budget Enforcement Act of 1990

Streamlining Defense Acquisition Laws, Report of the Acquisition Law Advisory Panel to the United States Congress, January 1993

Procedures For Obtaining Copies Of These Documents

There are presently three ways in which to request copies of the documents listed in this appendix.

1. Fill out a document request form at the Documentation Control Center. There is no limit to the number of documents that can be requested, but no more than two copies of each document will be provided. The PM is responsible for making further copies if needed. The turnaround time for this procedure is 2-3 days. The bookshelf on the right just inside the entrance to the Center holds the requested copies for pickup. Each request and its accompanying documents are placed on the bookshelf in alphabetical order using the last name of the person requesting the copies.

2. Fill out a Document Request Form. (There is one on page D-9). Only five documents may be requested at any one time, and no more than two copies of each document will be provided. The PM is responsible for making further copies if needed. This form can then be sent through the mail to the Documentation Control Center, ASE-621, or faxed to the center on FTS 967-2094. In both instances, address the request to the attention of Anne Rutemiller. (A sample fax from a regional center is located at the end of this appendix.) The turnaround time for this procedure is approximately 3-5 days for headquarters, and 15 days for regional offices. The RUSH service is available for emergency use only.

3. The optimum request procedure involves obtaining a DOCCON User ID. This will enable the PM to access the DOCCON computer data base directly (in many instances from a personal computer) to order the documents. The turnaround time for this procedure is usually 1-2 days. Occasionally, a requested document exists only on microfiche. If so, the Documentation Control Center will notify the PM and the turnaround time may be a little longer while the microfiche is copied or supplied.

The procedure for obtaining a DOCCON User ID is as follows:

- Fill out a Resource Access Authorization Request Form (There is one at the end of this appendix)
- Get requisite approval signatures from the appropriate FAA personnel
- Send the form to the Documentation Control Center, c/o Ms. Mary Anne Spicer

When the PM receives his/her User ID, he/she will also receive a copy of the DOCCON Program Control Tool General User's Reference Guide which explains the DOCCON computer process. Personnel at the Documentation Control Center will assist in answering questions and providing on-the-spot guidance until the copy request process becomes familiar.

One menu selection on DOCCON allows access to the listing of documents that are contained in the system. There is also a hardcopy listing which is available. A monthly update to this hardcopy listing is distributed to FAA division-level managers.

Document Request Form

From the Martin Marietta Air Traffic Systems Documentation Control Center

DATE:

TO: Anne Rutemiller, Documentation Control Center

FROM:

RE: Photocopy of Documentation

Please send _____ copy(s) of the following documents:

_____

Signature

Routing Address:

Telephone Number:

Sample Fax From A Regional Office

FAA, Northwest Mountain Region

New Denver International Airport Project Office

DATE: November 16, 1991

TO: Anne Rutemiller ROUTING: FTS 967-2094

FROM: ROUTING: ANM-458E2
(206) 227-1366

Request the following documents:

TI 6560.18, New Generation RVR-FA-10268 Offsite Instruction Book

Send To: Federal Aviation Administration
ANM-458E2
1601 Lind Avenue, SW
Renton, WA 98055-4056
FTS 392-1366

ATC Computer Center Form 1-1
Resource Access Authorization Request

APPLICANT:

Company:
FAA/_____
Applicant Name: First _____ MI_____ Last _____
Mail Point: _____
Address: _____
__
_____
_____
Telephone Number: _____

INITIAL REQUEST _____ CHANGE REQUEST_____
TOOL NAME ACCESS

DOCCON SYSTEM ATC

PURPOSE/USE (BRIEF DESCRIPTION)

General user access to query/retrieve information; place document orders online.

AWO NUMBER (IF KNOWN) _____

_____
Applicant Manager's Signature/Date

_____
Applicant Signature

CERTIFICATION (BY MARTIN MARIETTA)

I certify and approve the above request. The requestor has been briefed as to the prohibition of using terminals for processing Government classified information and the requirement to protect the confidentiality of logon/signon passwords and report any compromises of such passwords. I agree to have the user's logon/signon password changed immediately if compromised. I will notify Martin Marietta ATC Computer Center's RACF Administrator if the requestor's employment status changes, or if the employee has no further need for the above requested item.

_____
FAA Approval (As required)

TO BE COMPLETED BY ATC COMPUTER CENTER

Application	ATC	ID Number	Initial Password
_____	___	_____	_____
_____	___	_____	_____